NEW ZEALAND
JOURNAL OF
Agriculture
APRIL - 1959

21 MAY 1959

When it's a case of

WORM CONTROL IN SHEEP

C.M.R. have the answer

COOPAZINE
LIQUID

Keep them clean with

COOPAZINE

Contains Phenothiazine, today's most widely used drench for the safe and effective control of stomach and intestinal worms (does not control Tape worms or Liver Fluke).

COOPAZINE LIQUID
COOPAZINE POWDER
COOPAZINE TABLETS

Registered pursuant to Stock Remedies Act, 1934.

COOPAZINE

Ask your Stock and Station Agent!

COOPER, McDOUGALL & ROBERTSON (N.Z.) LTD.
AUCKLAND - - - - CHRISTCHURCH

Volume 98
Number 4
15 April
1959

NEW ZEALAND JOURNAL OF Agriculture

(Established 1910)

Published by
Direction of
Hon. C. F. Skinner,
Minister of Agriculture

Nostalgia for the homeland no doubt led pioneer settlers to plant the English trees which flank the streets of so many of our towns. In its autumn garb the avenue which lines the road into Arrowtown lends to this Central Otago township an air of tranquillity that gives little hint of the roisterous living it knew as a gold mining boom town of the 1860s.
[D. G. Jardine photo

NEW ZEALAND DEPARTMENT OF AGRICULTURE

HEAD OFFICE:
Dominion Farmers' Institute Building,
Featherston Street, Wellington

DIRECTOR-GENERAL:
P. W. Smallfield

ASSISTANT DIRECTOR-GENERAL:
I. J. Cunningham

DIVISIONAL DIRECTORS:

Administration	G. J. Anderson
Animal Industry	J. E. McIlwaine
Animal Research	J. F. Filmer
Dairy	H. A. Foy
Extension	J. W. Woodcock
Horticulture	A. M. W. Greig

Editor: G. J. Neale

CONTENTS

Hill Country Fencing	R. G. Warren	314
Grassed Orchards in New Zealand	C. E. Woodhead	323
Radio Broadcasts for Farmers		328
Army Caterpillar Damage on East Coast Hill Country	C. J. Hamblyn	329
Recent Research Work: Responses to Iron and Nitrogen on Peat		337
Danger of Using Arsenic-treated Timber for Beehives	D. L. Harrison, T. Palmer-Jones, and R. G. Nairn	338
Care of Livestock during May		340
Pasture Production and Weed Control (Seasonal Notes)		341
An Efficient Rush Digger	W. L. Osborn	342
Parasitic Worms in Poultry		343
Forage Cropping in Matamata County	B. A. Gunning	347
Pedigree Pig Improvement: Review of Progress up to 1958	A. Longwill	359
Winter Work for the Domestic Beekeeper	D. A. Briscoe	363
Identification of Rats and Mice in New Zealand	J. S. Watson	365
Meteorological Records		368
Aerial Topdressing Measurement Trials	Jean G. Miller and N. S. Mountier	369
Good Dog Housing: A Step in Hydatid Control	R. G. Gill	385
Checking Efficiency of Milking Machines	M. J. McFetridge	386
Dairy Produce Graded for Export		386
Winter Show Dates		386
The Home Garden	A. G. Kennelly	387
Care of Rubber in the Home	Maud B. Strain	397
The Flower Garden:		
Heaths	J. P. Salinger	401
Work for May	Rosalie A. Campion	406
Buying a Suit	Maud B. Strain	411

SUBSCRIPTION RATES

The "Journal" is issued monthly. The subscription within New Zealand is 10s. a year; the overseas subscription is 13s. (sterling). Subscriptions can be paid directly to any office of the Department of Agriculture, or the "Journal" may be ordered from any bookseller or newsagent. Individual copies are available from Publications Section, Department of Agriculture, P.O. Box 2298, Wellington, at 1s. a copy, post free.

Subscribers' inquiries (preferably accompanied by the address cut from a recent "Journal" wrapper) should be sent to the nearest office of the Department of Agriculture.

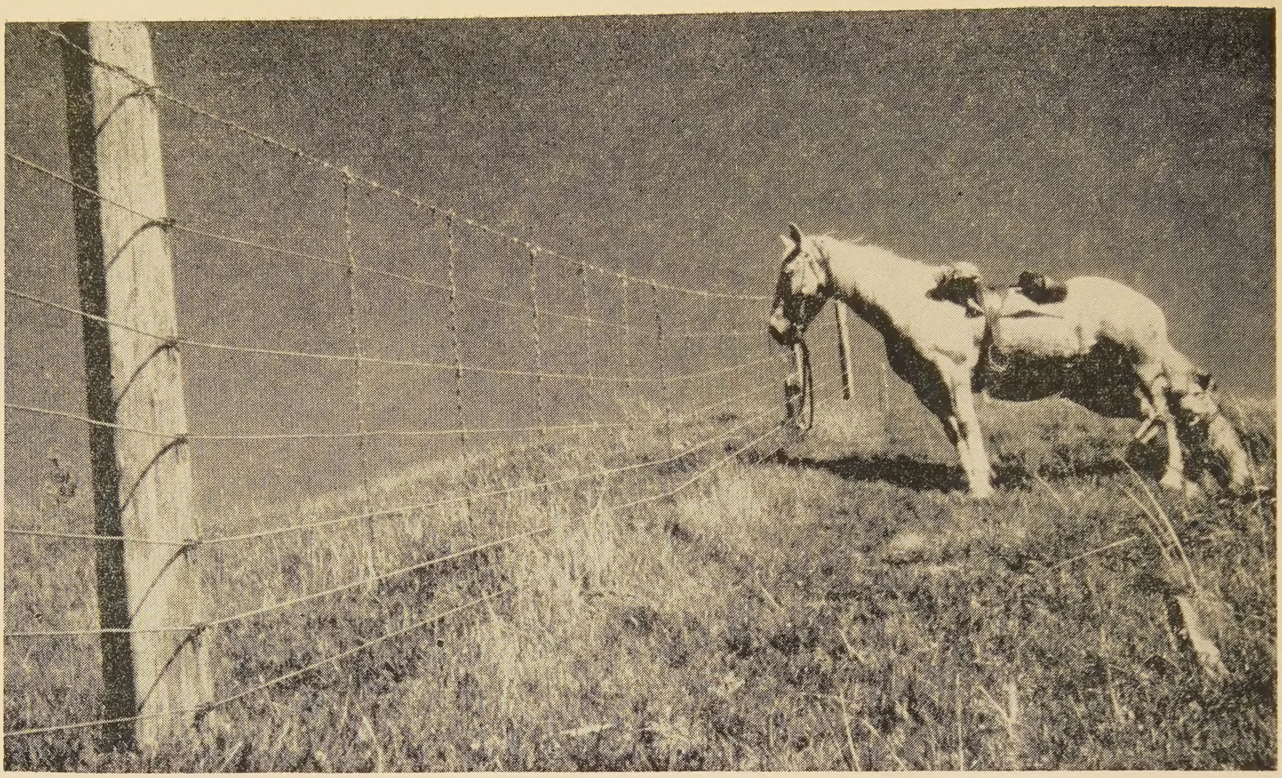
COPYRIGHT PROVISIONS

Articles in "The Journal of Agriculture" are copyright, but may be reprinted **provided both the "Journal" and author are acknowledged and the articles are not associated with advertising material.**

The Minister of Agriculture does not accept responsibility for any of the private and trade advertisements included in this publication.

All correspondence relating to the "Journal" should be addressed to the Editor, "The New Zealand Journal of Agriculture", P.O. Box 2298, Wellington.

REGISTERED AT THE G.P.O., WELLINGTON, AS A MAGAZINE



A section of a Hunter-type fence. The sixth chain from the left is heavy gauge and is tied down to a block.

Hill Country Fencing

By R. G. WARREN,

Instructor in Agriculture,

Department of Agriculture,

Dannevirke

THIS article, the first of two articles discussing the results of a recent investigation of farm fencing on hill country in the southern half of the North Island, describes conventional designs of fencing and some modifications. The second article, which will appear in a subsequent issue of the "Journal", will deal with the development and possibilities of electric fences on hill country, as recently there has been a revival of interest in electric fences because of technical improvements in their construction and working and because of the high cost of orthodox fencing.

THIS investigation was undertaken because despite the fact that even now many miles per day of new subdivision fencing are being erected on hill country, the demand created by aerial topdressing is being curtailed by the mounting costs of the standard post, wire, and batten fence, the scarcity of long-lasting posts and battens, and the shortage of labour for transporting materials and erecting the fences.

Further, it is known that there are a considerable number of modifications of the standard fence, but until recently no testing had been done of the strength and lasting qualities of modified fences, and farmers were naturally hesitant to make changes which might later prove to be unsatisfactory.

An Old Problem

The high labour requirement and cost of farm fencing have worried farmers for years. Many miles of modified fencing have been erected, but such fences have not met with widespread approval, and paddocks remain too large because of time and money limitations.

Concentration on the problem has produced from the farmer such ideas as the Hunter lightweight post, wire, and chain-batten fence, and from the manufacturer a steady flow of machine-made products—lightweight and thin wire; metal gates, posts, and battens; and electric fence units—insulators, batteries, and recently a wind-driven battery charger.

Farmers' supply merchants, the Aviation Industry Association of New Zealand, the Soil Conservation and Rivers Control Council, the Department of Agriculture, and the agricultural colleges have all given attention to fencing.

The Airworthiness Division of the Civil Aviation Branch of the Air Department in 1953 issued a report comparing the total costs for wood, steel, light alloy, and chain materials delivered to fence lines by surface and aerial transport. In 1955 the Soil Conservation and Rivers Control Council produced a very readable bulletin, "Airborne Fencing".

The Department of Agriculture has fencing trials at Tangoio and Waerenga-o-kuri Soil Conservation Farms, at Flock House, and at Invermay, and with the agricultural colleges is investigating the use of electric fences on hill country.

This recent survey, therefore, was but one further move in the pattern of development of fencing on our farms. In no way does it give a final answer to the country's needs. Its purpose was to identify the problem further by pointing out that in certain cases the unmodified post, wire, and batten fence is uneconomic and encourage those who are seeking a simple durable fence at reasonable cost.

Fencing Costs Compared

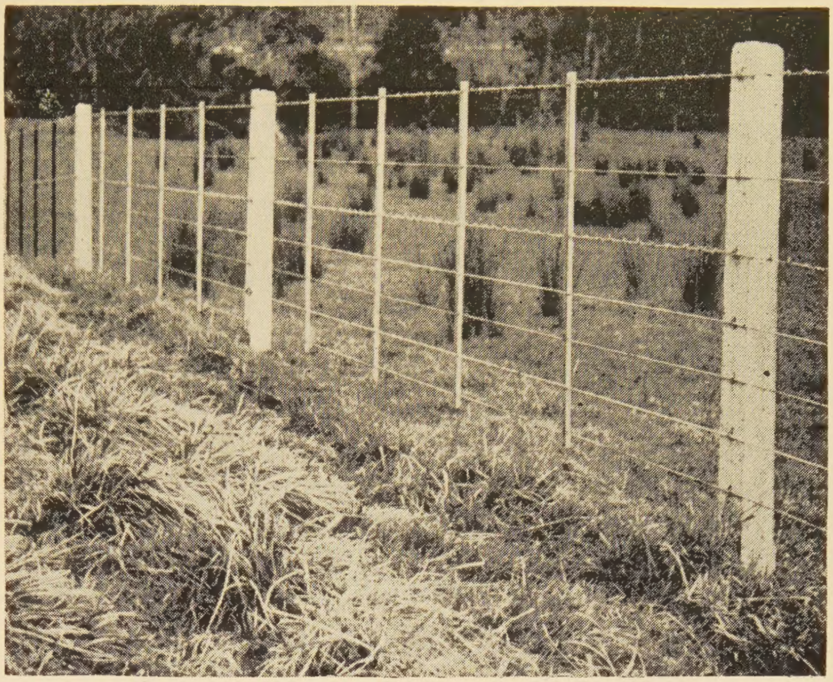
Before details of fence construction and suitability of various fencing materials are discussed a comparison is given, on a cost basis alone, of a number of types of fences which are being erected by farmers at present. Though many miles of fencing of the types listed in the tables are giving service on farms throughout the country, a closer study may further aid the quest for the fence which gives the best value for the money and labour spent.

For comparison the specifications and costs of materials for one mile of a standard hardwood post and batten, 7-wire fence are given in Table 1.

Table 2 shows comparative costs of transporting these fencing materials to a fence line and erecting the fence.

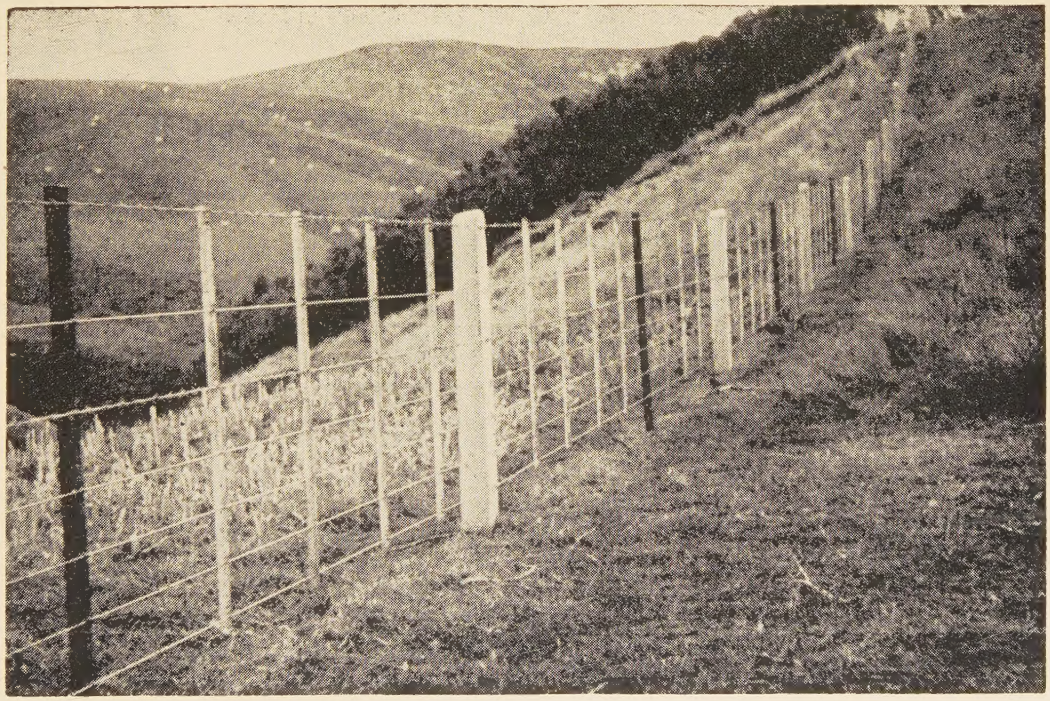
Table 3 shows the effect of various modifications on the costs of erecting a standard fence 20 miles from town by road and 1 mile across the farm.

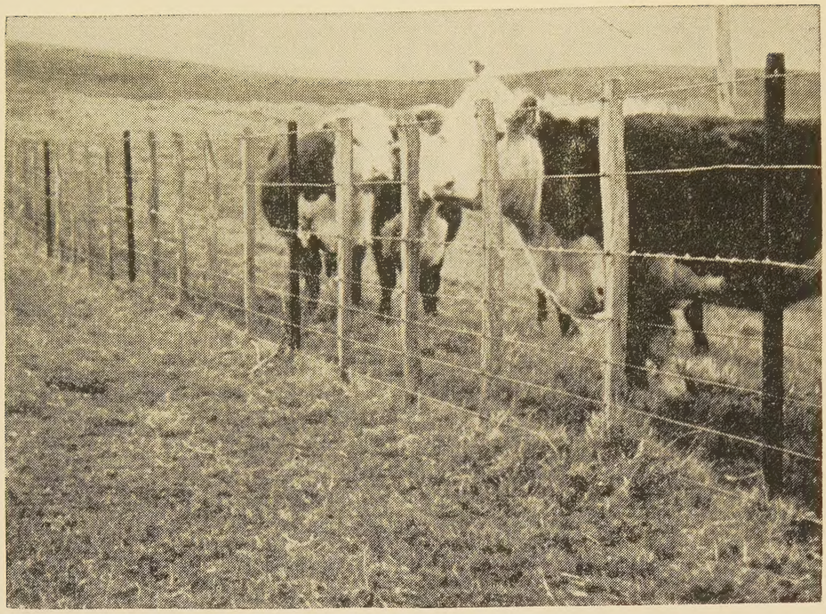
The remarkable saving of £210 afforded by the Hunter-type fence leads us to Table 4 where the specifi-



A typical concrete post and galvanised batten fence with No. 8 and barbed wires.

▼ This fence has alternate concrete and H-section steel posts with galvanised, multi-gauge battens which lock on to the wires with steel pins.





A seven-wire H-section steel post and wooden batten fence.

TABLE 1—SPECIFICATIONS AND COST OF MATERIALS FOR STANDARD WOODEN POST AND BATTEN, 7-WIRE FENCE

Description	Spacing	Number per mile	Weight per mile lb	Unit material cost	Material cost per mile £ s. d.
Strainer posts (hardwood 8 x 8 in. x 8 ft; 130 lb) ..	12 chains	8	1,040	£2 7s. 6d. each	19 0 0
Strainer stays (hardwood 5 x 4 in. x 10 ft; 30 lb) ..	2 per strainer	16	480	7s. 6d. each	6 0 0
Posts (hardwood, 6 x 4 in. x 6½ ft; 40 lb)	13 ft; 5 per chain	400	16,000	£56 per 100	224 0 0
Battens (hardwood, 4 lb) ..	3 ft	1,630	6,520	£6 per 100	97 16 0
No. 8 wire (350 lb per mile)	5 wires	5 miles	1,750	£78 per ton	60 18 9
No. 12 barbed wire (6 in. spacing; 370 lb per mile) ..	2 wires	2 miles	740	£98 per ton	32 7 6
Staples			170	£4 10s. per cwt	6 16 7
Total per mile of fence			26,700 lb (about 12 tons)		446 18 10

TABLE 3—COMPARISON OF COSTS FOR 1 MILE OF FENCING (Materials bought, transported 20 miles by road, taken 1 mile across farm to site, and erected)

	£
Standard wooden post and batten, 7-wire fence	745
Hardwood replaced with softer wood ..	—40
Hardwood battens replaced with steel	+50
Hardwood posts replaced with concrete	—28
Alternate hardwood posts replaced with steel H-section driven posts	—38
Hardwood posts all replaced with H-section steel driven posts	—56
Alternate hardwood posts replaced with steel standards	—62
Every second and third post replaced with steel standards	—93
Fence replaced with Hunter-type fence with treated softwood posts	—210

cations of a mile of such fence are laid out, and to Table 5, where the total costs of materials, transport, and erection are listed.

Conservative Estimates

These costings give a general picture where no unusual difficulties occur. However, as farmers know well, costs rise steeply where fence lines have to be cleared of scrub or bush; as gates, foots, flood gates, and extra strainers and stays are added; and where fencing materials have to be carried many miles over rough terrain.

Objections to Modifying Standard Fence

The normal post, wire, and batten fence has stood the test of time. It is known and understood by farmers. If well built on sound ground, it will last for many years without attention. It looks strong and it is strong.

Modified fences look frail and unattractive. Steel posts are easily bent. Chain-footed posts and chain battens give a fence a springiness which has little appeal to either the stock or the farmer. It is not always realised that the strength of a lightweight fence lies in its resilience—its ability to absorb shock and then bounce back.

Contractors, generally, prefer building normal fences. Less careful planning is required; unpopular work such as driving steel posts and fitting chains is avoided; the work takes longer per mile, so that moving is less

TABLE 2—COST OF ERECTION OF ONE MILE OF STANDARD WOODEN POST AND BATTEN, 7-WIRE FENCE

(Specifications as in Table 1)

Materials, £450

20 miles by road, £19

£469

	1 mile across farm			2 miles across farm			3 miles across farm			4 miles across farm		
	Packhorse (£48)	Trailer (£36)	Aircraft (£42)	Packhorse (£72)	Trailer (£54)	Aircraft (£63)	Packhorse (£96)	Trailer (£72)	Aircraft (£84)	Packhorse (£120)	Trailer (£90)	Aircraft (£105)
	£517	£505	£511	£541	£523	£532	£565	£541	£553	£589	£559	£574
CONSTRUCTION £2 10s. per chain	£717	£705	£711	£741	£723	£732	£765	£741	£753	£789	£759	£774
CONSTRUCTION £3 per chain	£757	£745	£751	£781	£763	£772	£805	£781	£793	£829	£799	£814
CONSTRUCTION £3 10s. per chain	£797	£785	£791	£821	£803	£812	£845	£821	£833	£869	£839	£854

TABLE 4—SPECIFICATIONS AND COST OF MATERIALS FOR TREATED WOOD POST, CHAIN BATTEN, 8-WIRE, HUNTER-TYPE FENCE

Description	Spacing	Number per mile	Weight per mile lb	Unit material cost	Material cost per mile £ s. d.
Strainer posts (creosoted larch, 60 lb)	12 chains	8	480	£2 each	16 0 0
Posts (creosoted larch, 30 lb)	⅓ chain	160	4,800	9s each	72 0 0
Strainer stays (larch, 5 x 4 in. x 10ft, 20 lb) ..	2 per strainer	16	320	7s. 6d. each	6 0 0
Footed chain posts ..	2 chains average	40	20	5s. each	10 0 0
Chain battens ..	3 ft	1,500	448	£6 per 500 ft	54 0 0
Steel battens	1½ per chain average	120	40	£9 per 100	10 16 0
No. 12-gauge wire ..		6	838	£4 per cwt	29 18 7
Barbed wire (3 in.)		2	740	£98 per ton	32 7 6
Staples			20		1 0 0
Batten clips			80	3s. 9d. per lb	15 0 0
Total per mile of fence			7,786 lb (about 3½ tons)		247 2 1

frequent and jobs do not have to be booked up so far ahead.

Unnecessary time and labour spent on fence maintenance reduces profits. Farmers naturally fear that lightweight fences will be a constant source of worry—and if badly planned or too lightly built, they no doubt will be.

Even the farmer who is determined to cheapen and modify his new fences has quite a problem on his hands, as it is impossible to obtain plans of suitable fences for holding stock on varying types of country.

For these reasons it is not surprising that changes in fencing practices have proceeded slowly.

Comment from Different Districts

Brief reports on fencing practices in the hill country of Gisborne, Wairoa, Central and Southern Hawke's Bay, the Wairarapa, Wanganui, and Stratford are given here.

Gisborne

From Gisborne came the detailed costs of erection of one typical boundary fence and two subdivision fences. The cheapest of these cost just over £700 per mile, and the other two, owing to the need for flood gates, cost about £900 per mile.

Iron standards are used on many farms to replace running posts. Considerable thought, too, is being given to the Hunter fence and there are many instances where the Hunter method is being partly used in the erection of new fences. Slips, erosion, and ever-widening stream beds are a worry to farmers and fencers on many of the east coast hills.

Totara and beech posts are practically unprocurable, and treated larch and pine posts and battens from Government sources are in high demand, but are also hard to obtain. Concrete posts are being used more today in hill country fencing than in the past.

Wairoa

Detailed specifications and costings from the Wairoa district show that generally practices are in line with those of other districts.

There has been a swing away from the use of native timber posts in favour of treated Oregon and radiata pines. Also there is a marked swing in favour of concrete posts, over half the posts of all types sold through Wairoa during the past year being concrete, a greater proportion being used on steep hill country in spite of high transport and handling costs.

Local supplies of beech posts are available. Demand in the past has not been high, as they sometimes vary in quality and do not last in some soils, but creosote treatment now given at the Tuai Mill should ensure a sound product. Commercial, county, and New Zealand Forest Service plantations of Oregon and radiata pines are already in production, and those at present being planted should provide supplies of local timber for many years, and there is a growing awareness of the value and need of farm woodlots.

Practically no major modifications have been made to fencing in the district. The main alteration has been the use of steel standards to replace every other post, and sometimes two posts in three, and patent steel battens of various designs are also widely used.

A few farmers have successfully erected Hunter-type fencing. One station manager has even eliminated the barbed wire and chain battens, but he emphasises that the fence must be very soundly built and the wires kept drum tight.

Central Hawke's Bay

The cost of a recently erected ½ mile of concrete post, No. 8 wire, and steel batten fence was £488 14s. In this case £30 was spent on laying and clearing the line and four gates were hung. Without allowance for gates this fence cost over £950 per mile.

The cost per mile of a concrete post and iron standard (alternate), No. 8 wire, and steel batten fence was £600, which did not include cost of cartage or laying the line. The erection costs were £2 5s. per chain.

The cost of the Hunter fence varies from £350 to £600 per mile. One farmer stated that he had erected a Hunter fence for £350 per mile, and erection costs by contract were £1 per chain. Another farmer stated that by doing all the work himself he could erect a fence for about £380 per mile.

TABLE 5—COST OF ERECTION OF ONE MILE OF HUNTER-TYPE FENCE

(Specifications as in Table 4)

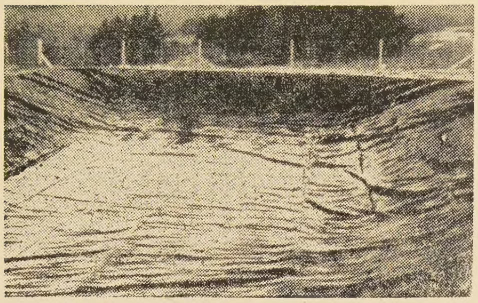
Materials, £250

20 miles by road, £5

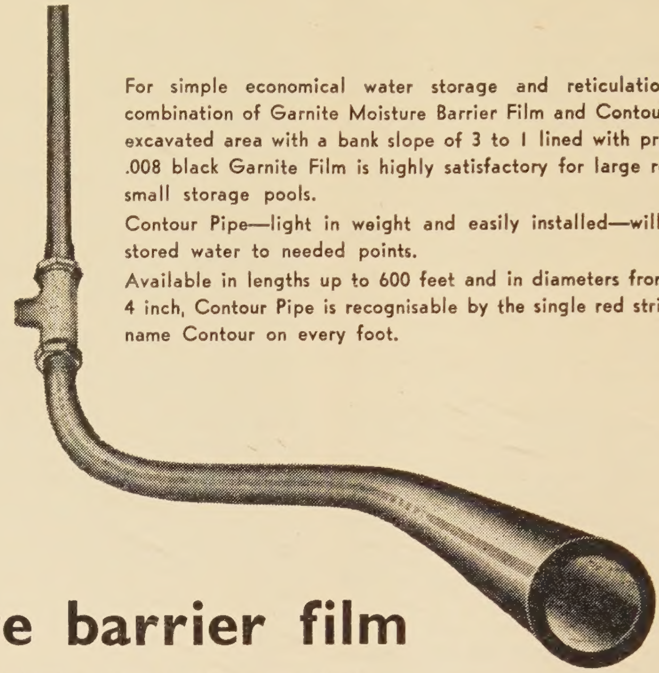
£255

	Packhorse	Trailer	Aircraft
1 mile across farm	(£14) £269	(£11) £266	(£12) £267
CONSTRUCTION £2 10s. per chain	£469	£466	£467
CONSTRUCTION £3 per chain	£509	£506	£507
2 miles across farm	(£21) £276	(£17) £272	(£18) £273
CONSTRUCTION £2 10s. per chain	£476	£472	£473
CONSTRUCTION £3 per chain	£516	£512	£513
3 miles across farm	(£28) £283	(£22) £277	(£24) £279
CONSTRUCTION £2 10s. per chain	£483	£477	£479
CONSTRUCTION £3 per chain	£523	£517	£519
4 miles across farm	(£35) £290	(£28) £283	(£30) £285
CONSTRUCTION £2 10s. per chain	£490	£483	£485
CONSTRUCTION £3 per chain	£530	£523	£525

Water WHERE and WHEN you want it



Garnite Moisture Barrier Film liner in position for 150,000 gallon reservoir.



For simple economical water storage and reticulation use the combination of Garnite Moisture Barrier Film and Contour Pipe. An excavated area with a bank slope of 3 to 1 lined with prefabricated .008 black Garnite Film is highly satisfactory for large reservoirs or small storage pools.

Contour Pipe—light in weight and easily installed—will carry this stored water to needed points.

Available in lengths up to 600 feet and in diameters from ½ inch to 4 inch, Contour Pipe is recognisable by the single red stripe and the name Contour on every foot.

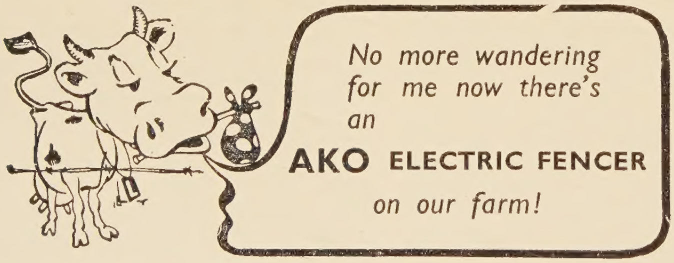
with CONTOUR PIPE

and Garnite moisture barrier film

Made by A.C.I. Plastics Pty. Ltd., Penrose, Auckland.

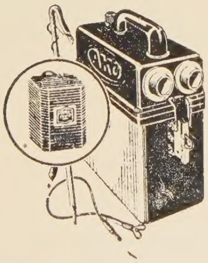
Sole Selling Agents: Neill, Cropper & Co. Ltd., P.O. Box 74, Auckland; P.O. Box 583, Wellington; P.O. Box 1378, Christchurch; P.O. Box 703, Dunedin.

Available from Stock and Station Agents, Dairy Companies and Progressive Stores throughout New Zealand.


No more wandering for me now there's an AKO ELECTRIC FENCER on our farm!

Europe's leading fencers . . . labour-saving, safe, reliable and economical.

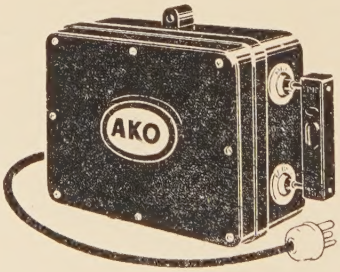
Fully warranted, complete with all accessories.



BATTERY MODEL

Operates from wet battery or EVEREADY 1462 dry battery . . . precision engineered . . . case and battery container sturdily constructed from weather-resistant materials to ensure a long, reliable life.

£14/19/6



MAINS MODEL

Efficient, trouble-free. Excess voltage conductor built into the controller. Complete with output indicator. Permanently installed in central position, this Fencer saves hundreds of pounds on fencing costs!

£18/18/-

AKO ELECTRIC FENCERS

Available everywhere.

Distributed throughout N.Z. by HAMER ELECTRICAL CO. LTD.,
Auckland — Wellington — Christchurch — Dunedin.
N.Z. Agents: HOOKER & CO. LTD., PANMURE.

However, the average cost in the district is about £500 per mile.

The Soil Conservator, Hastings, has supplied complete specifications and costs of the four types of fencing erected for testing on the Tangoio Soil Conservation Farm, and some details are given here. No allowance as been made for gates in the costs of the various types of fences.

Concrete fence: Concrete posts and strainers, three types of steel battens, four No. 8 wires, two No. 12½ steel wires, and a barbed wire on top. Materials, £464 per mile. Total cost erected, £753 per mile.

Hunter fence: Concrete posts and strainers, Hunter fence chain battens and foots, three No. 8 wires, two No. 12½ steel wires, two barbed wires (top and bottom). Materials, £301 per mile. Total cost erected, £488 per mile.

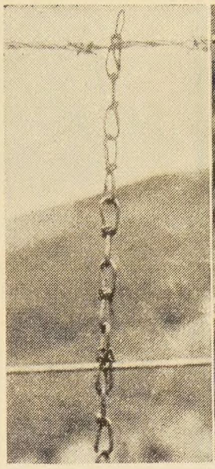
Wooden fence: Wooden posts, strainers, and battens; four No. 8 wires, two No. 12½ steel wires, and a barbed wire on top. Materials, £461 per mile. Total cost erected, £749 per mile.

Steel fence (aerial fence): Steel posts, strainers, angles, and battens; four No. 8 wires, two No. 12½ steel wires, and a barbed wire on top. Materials, £808 per mile. Total cost erected, £982 per mile.

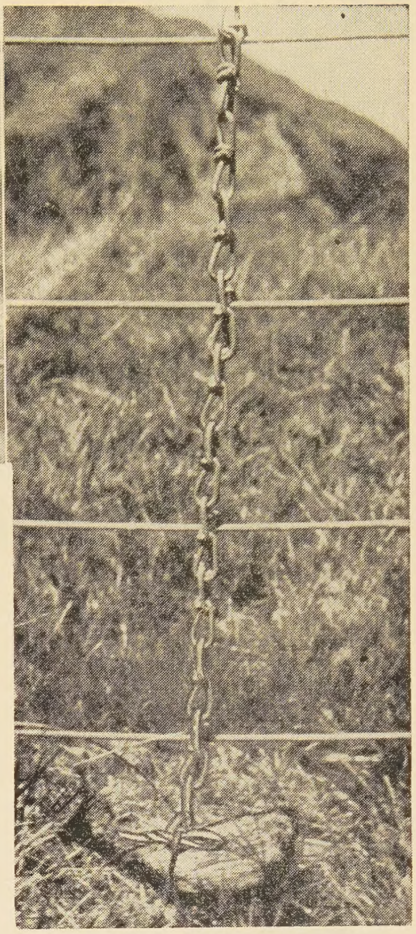
In Central Hawke's Bay, too, concrete posts are being used in many fences. A wide variety of wooden posts is available from merchants, but first-class wooden battens are in short supply.

Southern Hawke's Bay

Methods of fence construction used in Southern Hawke's Bay form the basis of the general discussion on the subject later in this article.



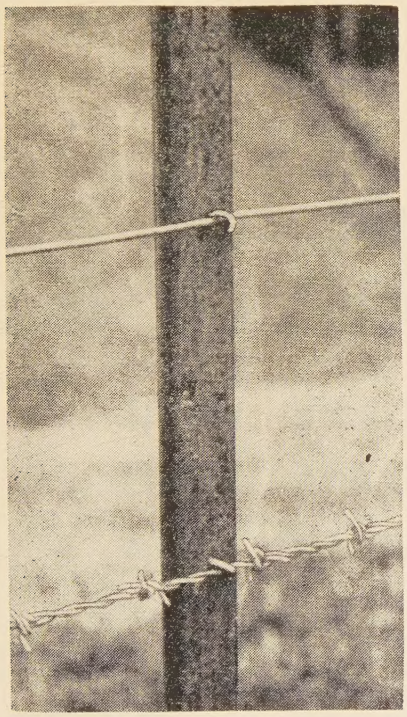
▲ A Hunter chain batten. The 3 in. barbed wire is to deter stock from clambering over the fence and also to stop the chain from sliding.



This heavy-gauge chain on a Hunter fence is tied with stainless-steel wire to a block in the ground. Posts hold the fence off the rises and chains pull it down to the hollows.

Wairarapa

The costs per mile of three fences studied in the Wairarapa district were £691, £821, and £1,154, the last-named fence being particularly expensive, as £124 were spent on erecting flood gates.



Staples are used to hold the wires to an H-section steel post driven into the ground.

The principal modification used is the Hunter-type fence using either fine-gauge wire or No. 8 wire. The fences appear very satisfactory and the savings they allow are very substantial.

Increasing use is being made of metal standards, both the steel and wrought-iron type. This is especially important where materials have to be packed on to the line and on rocky country.

One farmer is experimenting with a lightweight fence, using tubular steel strainers, steel standards, No. 8 and barbed wire, and chain battens. With some modifications this could be useful on certain farms.

Generally the older established farmers continue to favour the standard post and batten fence.

Mr W. B. Hull, of "Waierua", Wharearna, has for some years been using creosoted pine posts. These appear to be light and strong, and posts in the ground for 16 years have so far shown no signs of decay. Mr Hull has planted pines and other trees for many years and is an authority on forestry and timber.

The trees have been maintained as woodlots by thinning and pruning. A cold creosote treatment is used for the posts, which are round limbs with bark removed and the timber seasoned. The estimated cost, including labour for planting, maintenance of the plantation, felling, and creosote is £36 per 100 posts. Cold creosote treatment costs 2s. 3d. per post, about ¾ gallon of creosote being used per post.

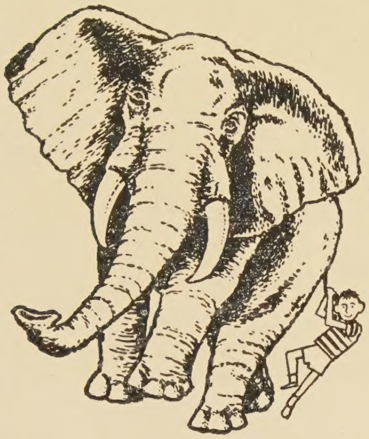
Battens are made from split and seasoned pine, and the average quantity of creosote used per batten is ⅔ pint.

Farmers who have suitable trees could produce relatively low-cost fencing materials in this way. The trees need to be fairly young for posts, as the sapwood absorbs creosote, but heartwood does not.

Wanganui

Detailed specifications and costs of fencing were obtained from a number of farmers in the Wanganui area. The total cost per mile paid by the farmer was, in almost every case, much the same as in any other district. However, most of these farmers had either supplied their own labour or were using posts and battens split on the

What's holding it back?



When a powerful diesel loses its pull it is often something comparatively minor that's holding it back—fuel pump adjustment, faulty injectors or something of the sort.

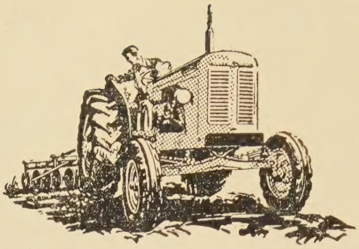
But the quickest, cheapest way to get your Tractor working at full power again is to consult your nearest C.A.V. Fuel Injection Specialist below. His special test equipment will locate the trouble straight away.

For all diesel diagnosis consult your nearest

C.A.V.

service specialist below

	Phone
WHANGAREI: Whangarei Engineering Co.	2639
AUCKLAND: Joseph Lucas (N.Z.) Ltd. 75-77 Beach Road - - 3 lines	34-330
HAMILTON: Joseph Lucas (N.Z.) Ltd., Unity Buildings - - - - -	40-840
ROTORUA: Joseph Lucas (N.Z.) Ltd., Amohau Street - - - - -	2229
TAURANGA: Joseph Lucas (N.Z.) Ltd., Grey Street - - - - - -	1010
WHAKATANE: Joseph Lucas (N.Z.) Ltd., Commerce Street - - - - -	124
HASTINGS: L. M. Silver & Co. Ltd., 202 Jervois Street - - - - -	2043
PALMERSTON NORTH: L. M. Silver & Co. Ltd., 79 King Street - -	2149
WANGANUI: L. M. Silver & Co. Ltd., 263 Victoria Avenue - - -	8478
WELLINGTON: L. M. Silver & Co. Ltd., Jervois Quay - - - - - -	54-555
CHRISTCHURCH: Wooff & Salvesen Ltd., 17-19 Lichfield Street - -	60-449
TIMARU: A. M. Duncan, 34 Latter St.	1594
GREYMOUTH: Greymouth Motors Ltd., Guinness Street - - - 256 &	1080
DUNEDIN: Wooff & Salvesen (Dunedin) Ltd., 260 Cumberland Street - -	13-642
INVERCARGILL: Hugh Stubbs Ltd., 57 Leet Street - - - - - -	133



DAVID BROWN

makes farming easier, saves you money . . .

with "LIVE DRIVE" and "TRACTION CONTROL"

"LIVE DRIVE"—revolutionary new single-pedal power-control that ensures constant supply of power to P.T.O. or hydraulics.

"TRACTION CONTROL"—exclusive David Brown method of positively overcoming wheelslip. Ask for demonstration.

David Brown '900' Wheel tractors offer you these outstanding features — "Live Drive" and "Traction Control". These are but two of the many modern features which are *standard equipment* on the David Brown.

There's a David Brown for every purpose—wheel & crawler — petrol & diesel — full range of matched implements — 12 months' warranty — low interest terms.

Todd Bros. Ltd., P.O. Box 2295, Wellington.

Please send me details of David Brown Wheel/Crawler tractors.

Name ____________________

Address ____________________

____

DB205

N.Z. Distributors: TODD BROS. LTD., Wellington. *Dealers everywhere*

DON'T ACCEPT SUBSTITUTES!

Insist on genuine

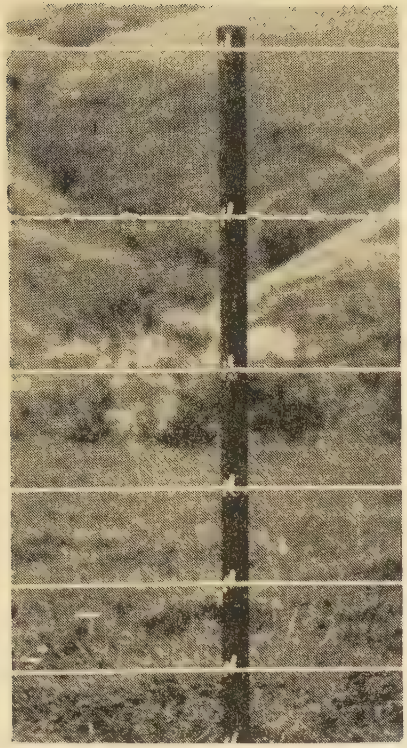
MOOSE

LINSEED OIL-CAKE MEAL
LINSEED OIL-CAKE NUTS
LINSEED BALANCED NUTS

A whole generation of New Zealand farmers can testify to the quality and value of MOOSE Linseed Oil-cake Meal and Nuts. It's the MOOSE *quality* that has made MOOSE invaluable on every farm—*extra* rich in protein, and in health-giving linseed oil.

REG. TRADE MARK
MOOSE
N Z

G9246



This fence is lower than normal fences. Built of alternate concrete posts and steel standards, it has been lowered to take seven wires on posts designed for eight. (The staple for the bottom wire is just visible at the bottom of the illustration.) Fences similar to this have been re-strained and battened 12 months after erection, and the owner reports that they are cattle proof and long lasting.

farm. When full allowances were made for the supplied labour and the posts and battens costed out at market prices the total cost per mile rose very steeply indeed. For example, the estimated total costs per mile of fences on four farms on steep, difficult hill country were £895, £1,171, £1,011 and £897.

The Hunter fence is being used to a limited extent in this area, but generally there has been little change in hill country fencing practice, except for a tendency of some farmers to change over to steel battens and some standards to reduce the cost of handling the fencing materials.

The three-wire electric fence described in the May 1956 issue of the "Journal of Agriculture" is being tried on the easier country. It is said that four men can erect a quarter of a mile of three-wire electric fence on easy country in 3 hours—using steel standards on the angles.

A few miles of permanent five-wire electric fence have been erected on some hill country and on the Waiouru desert area. The design of these fences is based on the electric fence installed some time ago at Massey College "Rata" farm in southern Hawke's Bay.

There are still fairly good sources of supply of wooden posts and battens in the Waimarino area, but elsewhere supplies of native timbers have practically been exhausted.

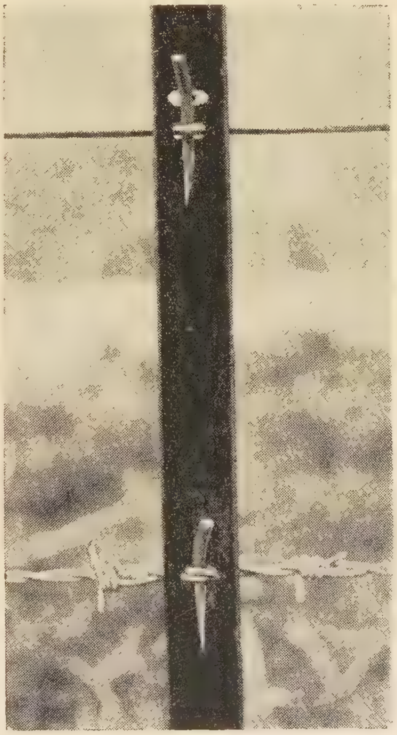
Stratford

In the Stratford district 24 farmers gave details of the types of subdivision fences on their farms, listing the materials used and their cost.

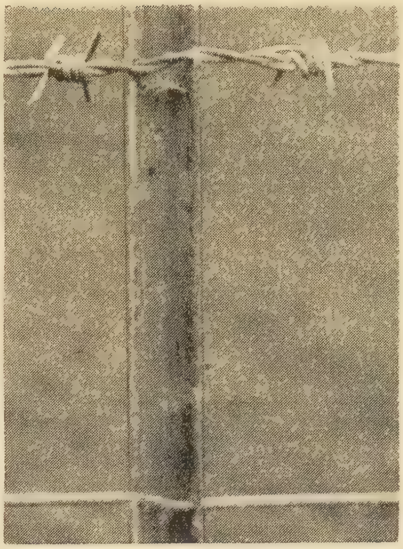
The survey shows that concrete posts are popular in this district, too, though it is noticeable that most of the farms where they are used are near railway stations. Only one farmer has had trouble with concrete posts and this was due to the reinforcing being insufficiently covered. A second farmer avoids using concrete posts where his fences are subject to heavy strain.

A wide variety of wooden posts has been used on these farms including Australian hardwood, silver pine, red beech, creosoted larch, totara, and macrocarpa, the last two types being split on the farms.

Some of the farmers have erected Hunter fencing and are very satisfied with it. One farmer mentions that the only fault that he can find with the Hunter fence is that it does not look as sturdy as a normal fence.



A black steel batten with a tapered fastener. Some types of battens attached with pins will not stay on a loose fence.



A popular, easily fitted galvanised-steel batten. Battens must be very strong to withstand rough treatment from cattle. The deep slots in this type of batten make them more liable to bending by cattle.

A general preference has been shown for No. 8 plain and barbed wire, but some fine-gauge steel wire is being used with one or two barbed wires.

There were a number of interesting comments on the value of electric fences for holding sheep. Five farmers had tried such fences for break feeding grass and crops. In each case three wires were used and all of them were electrified. There was general agreement that the electric fence was useful; in fact one farmer reported that he has been using such a fence for 20 years and in his opinion it is excellent for controlling sheep on temporary breaks.

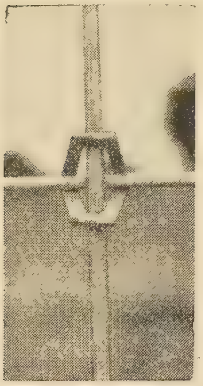
Fence Construction

Table 3 lists the main fence types erected in the hill country of the districts covered by the survey.

Within these general types details of construction, such as fence height, the spacing of posts and battens, and the number and gauge of wires, may vary considerably.

Posts

Concrete: There is widespread use of concrete posts and strainers where fence lines are readily accessible from roads. Even farmers in hill country reached by many miles of winding shingle roads are using concrete posts in new fences. It is estimated that a



← A simple wire batten and clip. An improvement on this style is the double crinkled wire loop batten, which is easily attached with a wire clip and is cheap and light.

standard concrete fence weighs about 18 tons per mile.

Such posts form an attractive and well finished fence, and with properly constructed posts such fences should have a long life.

However, poorly made posts are reported to fail after a very short time. It is imperative, therefore, that farmers should buy only well constructed posts.

Wood: Ideas about wooden posts have been revised in recent years owing to the shortage of really good timber. Properly treated softwood posts are now being used widely and are giving good service.

Metal: As the district reports indicate, steel standards have been extensively used to replace posts, but though some farmers are using steel and batten fences (using strainers, but no proper posts) for subdividing sheep and cattle country, fences are reported to become too weak if more than two out of three posts are steel standards.

H-section iron standards have been found suitable for replacing normal posts in certain fence lines. Their stability naturally depends on the firmness of the ground in which they are driven. In hollows they are unsuitable and are better replaced with a footed post or chain. On rises plates should be fitted to stop the standards sinking when the wires are strained.

Galvanised angle-iron posts and strainers were designed and tested some years ago, but were found to be too expensive for general use.

Chain-footed posts are becoming more popular. They are ideal where fencing material is being carried by air. Where access is easy, a block of concrete gives the foot a better hold than is given by a stainless-steel footplate. The concrete block is particularly useful in soft ground. Sometimes, too, where gullies are sudden and narrow, it is wise to place two chains on each concrete foot, as this lessens the chance of the stainless-steel connecting wires being shorn off by any undue load.

Battens

Many types of wooden battens of varying price are on the market. Supplies are readily available in most districts at present, but indications are that in a few years supplies within New Zealand will be largely limited to battens of treated softwoods such as treated pine and creosoted larch.

Metal battens of various styles are also available. Some are very much more expensive than wooden battens, but are quickly fitted and look smart. Some types, however, are quite unsuitable for fences subject to rough treatment from cattle, as they bend badly and may even break.

The simply fitted, crinkled wire loop batten is cheap and has the advantage that it will flex without breaking.

Chain battens are not popular, as it takes experience to fit them quickly, and unless barbed wire (preferably 3 in.) is used at the top and bottom of the fence, they are easily moved. They have the great advantage that they are very easy to carry, are reasonably cheap, and, if well galvanised, are almost everlasting. As the chains cannot resist compression, metal spacer battens should be used at intervals in long spans of Hunter fencing.

Wire

No. 8 gauge wire has been accepted for many years as standard for general use, but No. 7 wire is also used quite extensively.

No. 12 gauge galvanised steel wire has been used to a limited extent. It is more expensive per ton than No. 8 wire, but stretches about three times as far. It apparently gives good service provided that it is not overstrained when new, it is not allowed to come in contact with the ground, figure 8 joins are not used, and it is not kinked by staples or battens.

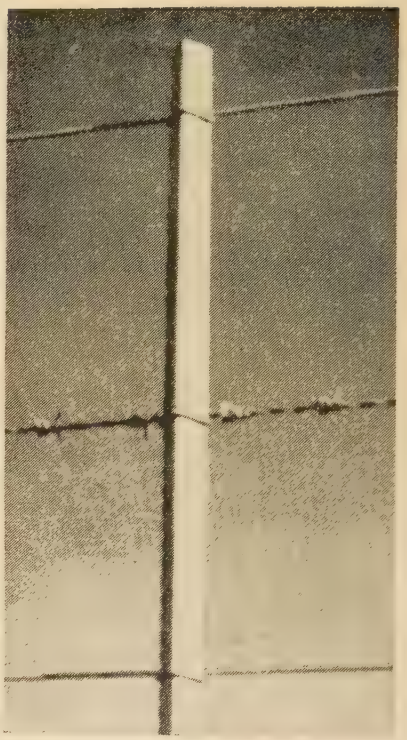
Barbed wire is very variable in quality. Though it is more difficult to handle and strain, 3 in. barbed wire is favoured by many farmers, as they say it is more effective than wire with the barbs 6 in. apart.

Spacing of Posts

Generally 5 to 5½ posts (or equivalent standards) are placed in each chain of new fencing except when chain battens are used. In the latter case the distance between posts may vary from 12 ft up to 2 chains, this being possible because the chain battens will stand a great deal of knocking about.

Other Factors

It seems to be accepted that battens should be spaced about 3 ft apart, though here again there are many variations.



Improvements are constantly being made in metal batten design. There are no deep cuts or slots in this type of batten.

Ideas differ, too, on the number and spacing of fencing wires. Cattle men usually prefer eight-wire fences, but seven wires are often adequate where cattle are reasonably quiet. Some farmers are trying six-wire fences on hill country. A few wires will no doubt hold very quiet cattle. However, fences need to hold lambs reasonably well, so there is a limit to the reductions that can be made.

There is little variation in fence height. Fences which are an inch or so lower than normal are found in most districts, but they are few and far between.

As the construction of all boundary fences is governed by the Fencing Act, it is not surprising that fencing methods are fairly standard throughout all districts.

References

D. A. Campbell, "Airborne Fencing", Soil Conservation and Rivers Control Council Bulletin No. 12, 1955.

Airworthiness Division, Civil Aviation Branch of Air Department, Technical Report No. 98, "Fencing Material for Back Country Use in New Zealand", 1953.

F. J. S. Holden, "New Type of Fence Designed by Hawke's Bay Farmer", "The New Zealand Journal of Agriculture", Vol. 81. p. 457, 1950.

G. S. Wilson, "Cheaper and More Permanent Fencing", "The New Zealand Journal of Agriculture", Vol. 91, p. 569, 1955.

Survey reports from Gisborne, Wairoa, Hawke's Bay, Wairarapa, and Wanganui.

The assistance given by farmers, fencing contractors, and agents of firms is also acknowledged.

HEADING PHOTOGRAPH: A good white clover sward on sandy loam on the orchard of Mr E. O. Emanuel at Rapaura, Blenheim. It was sown in 1956 with perennial ryegrass and white and subterranean clover. The ryegrass has almost completely disappeared.

Grassed Orchards in New Zealand: A Review of Developments

By C. E. WOODHEAD,
Pip Fruit Specialist, Department of Agriculture, Palmerston North

SINCE the first orchards were grassed in New Zealand about 1948 the practice has developed until today grassed orchards are to be found in all fruitgrowing districts. There are now an estimated 2,000 acres of orchard in permanent grass, consisting mostly of pip fruit, but including some stone fruit and citrus. Of this total Hawke's Bay has 750 acres, Auckland 490, and Motueka 230. There has recently been a considerable expansion of grassing at Mapua and Alexandra. A representative selection of 35 grassed pip fruit orchards and a number of stone fruit and citrus orchards is under observation, so that the system is on trial on a great variety of soils and under such extremes of climate as are represented by the irrigation areas of Central Otago and the mild, high-rainfall districts of the North Island. Advantages already observed are a favourable effect on the condition of pip fruit trees, a better orchard surface for working on, the elimination or reduction of soil erosion, and in some instances improvement of drainage.

IN England the practice of sowing down orchards to permanent grass has become widespread over the last 20 years, following the realisation that orchard soils were deteriorating after years of cultivation. In New Zealand frequent cultivation in spring and summer, followed by a winter cover crop, has been the accepted system of orchard soil management.

In recent years, however, injury to the soil caused by "clean cultivation" over periods of up to 40 or more years

Calf Castration!

Some cattlemen use the knife because they cannot judge a fat beast except by the cod.

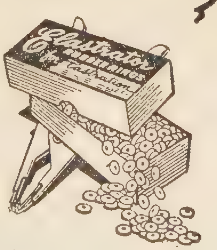
A sound judge knows his fats — cod or no cod.

The

ELASTRATOR

method does leave a little less cod but is

UNSURPASSED FOR QUICK, CLEAN, BLOODLESS CASTRATION OF CALVES



From all
STOCK and
STATION
AGENTS
or direct from
ELASTRATOR CO. LTD.
Box 226, Blenheim

VETSPEN *Penicillin* CERATE

FOR THE TREATMENT OF **MASTITIS** *IN DAIRY COWS*

AVAILABLE IN FOUR STRENGTHS

'25'	'50'	'100'	'500'
25,000 units penicillin per tube	50,000 units penicillin per tube.	100,000 units penicillin per tube.	500,00 units penicillin per tube.

GLAXO LABORATORIES (N.Z.) LTD., PALMERSTON NORTH

VC7.8

---

the land our livelihood

The economy of our country . . . our domestic well-being . . . depends upon an expanding production and successful marketing abroad of our primary produce.

The National Bank is proud of its long and close association with all phases of New Zealand farming. Farmer customers are invited to look to the Bank to assist them with seasonal and short-term finance for the maintenance and expansion of farm production.

Providing a complete, comprehensive service to Primary Producers

The National Bank

OF NEW ZEALAND, LIMITED.
Established 1872.

FB-1

has become increasingly evident in the loss of "crumb structure", impeded drainage, and continuing erosion. Many fruitgrowers in New Zealand have therefore turned to permanent grassing as a means of restoring the fertility and physical condition of the soil.

The earliest developments in this direction took place in the Auckland district between 1948 and 1950 when a few orchards were grassed. These were soon followed by others in the same district and also in Nelson and Hawke's Bay, until today grassed orchards are to be found in all fruitgrowing districts.

Advantages of Grassing

Practical experience of the system in England, supplemented by comprehensive trials at research stations, has shown that with correct management the following benefits may be gained from grassing:

1. Pleasanter working conditions and a better working surface for orchard operations.
2. Prevention of soil erosion.
3. Increase of organic matter in the soil, resulting in better physical structure, aeration, and drainage.
4. Release of potash from the soil.
5. Correction of some trace element deficiencies; for example, iron.
6. Reduction of pre-harvest fruit drop.
7. Improved fruit colour.
8. Reduced storage loss from low-temperature breakdown and lenticel rot.
9. Grassing is an effective means of checking excessive growth and inducing earlier cropping of young trees on vigorous rootstocks; for example, M.XII.

Observations in New Zealand

Because of climatic and other differences it cannot be assumed that all the benefits noted in England will necessarily follow the grassing of orchards in this country or that the grass mixtures and management practices employed overseas will be the most suitable for conditions in New Zealand. Inevitably it will be some years before the long-term effects of grassing can be assessed.

Information on the results of grassing since the system was introduced some 10 years ago will, however, assist fruitgrowers who are considering sowing down their orchards and this is being collected by the Horticulture Division, Department of Agriculture.

Starting about five years ago with general observations in Auckland, Hawke's Bay, and Nelson, investigations were extended in 1957 to include all districts with the selection of 35 grassed pip fruit orchards and a number of stone fruit and citrus orchards for more systematic observation over a term of years. The selected pip fruit orchards include both apples and pears, ranging in age from young trees to trees 52 years old. They are representative of orchards on flat, gently sloping, and moderately steep country, and the soil types include sandy loams, silts, clay loams, and shallow clays.

The following account of grass swards, management practices, and effects of grassing on pip fruit orchards has been prepared both from the earlier general observations and those made more recently on the selected orchards.

Grass Swards

If the orchard is to benefit to the fullest extent from grassing, the sward should provide the following requirements:

1. An abundance of grass roots to build up organic matter in the soil. Grass roots is used here in the wider sense to include clovers.
2. A high proportion of clover to supply nitrogen.
3. An even and dense ground cover in the shortest possible time.

Grass roots are important for three reasons. In penetrating and breaking up the soil growing roots increase aeration and improve drainage. Dead roots provide the humus which is so necessary for the fertility and good physical condition of the soil. Finally, dead roots play an essential part in maintaining a high population of earthworms.

Research by Grasslands Division, Department of Scientific and Industrial Research, has revealed that the soil of a productive pasture contains an average of one ton of earthworms per acre, a greater weight than that of the stock grazed on the pasture (1). It was also shown that dead grass roots supply the chief food of the worms, decayed herbage above ground being of minor importance in this respect (2). In view of the major part played by earthworms in the decomposition and mixing of plant residues with the soil and in the improvement of soil structure, aeration, and drainage, this function of grass roots is particularly important.

It is well known that clovers are able to obtain their nitrogen requirements from the free nitrogen present in the soil atmosphere and are thus independent of soil nitrogen. Research in New Zealand has shown that pedigree white clover in a pasture may contribute nitrogen equivalent to as much as a ton of sulphate of ammonia per acre annually, depending on the quantity of clover in the pasture (3).

It should not be assumed, however, that a new sward containing a high proportion of clover will thus provide fruit trees with an abundance of nitrogen, as considerable demands on the nitrogen supply are made by grasses in the sward and also by the numerous soil organisms concerned in the decomposition of organic matter.

In practice it has been found that the trees are likely to suffer from nitrogen deficiency in the early years of grassing, unless supplied with greater amounts of nitrogenous fertiliser. The deficiency will be greater, however, in a predominantly grass sward and for this reason and also to provide for a gradual build up of soil nitrogen over the years, every sward should contain a good proportion of clover.

The third requirement, speedy establishment of a close turf, is necessary to prevent invasion by weeds of little value compared with the selected grasses and clovers sown and also loss of soil moisture where the surface cover is patchy.

Tumbledown Swards

In a number of orchards, chiefly in the vicinity of Auckland, a sward has been established by mowing volunteer grasses and weeds. Of two such orchards where this method was followed three or four years ago, couch grass, Yorkshire fog, and white clover are now prevalent in one and couch grass and white clover in the other. In one of the two orchards fruit size was reduced, but in the first two seasons only. In the second orchard, consisting of mature pear trees which were growing too vigorously before grassing, growth of the trees has been checked and production is increasing. Both orchards have had greatly increased quantities of nitrogenous fertiliser since grassing.

There is little general evidence that tumbledown swards have adversely affected growth or production, but this may be due to their being mainly confined to the Auckland district, which has a relatively high rainfall. For reasons discussed in the preceding section this method of establishing a sward is not recommended.

Sown Swards

In the majority of orchards sown down to grass a mixture of perennial ryegrass and white clover has been used, other grasses and clovers such as short-rotation ryegrass and Montgomery red clover being sometimes included. Perennial ryegrass and white clover mixtures have given good permanent swards, though in some Auckland orchards a considerable invasion by prairie grass has occurred. The ryegrass-clover sward is not favoured by some growers because of the very frequent mowing required to control the ryegrass in spring and early summer. However, in many orchards sown with this mixture it has been observed that after two or three seasons of frequent cutting a sward consisting mainly of clover has

DO YOU KNOW?

BANK OF NEW ZEALAND

YOUR BEST FRIEND IS A B.N.Z.

Cheque Account

A B.N.Z. Cheque Account simplifies the payment of bills and household accounts—and opens the door to the many services and facilities the Bank of New Zealand has to offer. It safeguards your funds, keeps them instantly accessible, and stamps you as a responsible person in money matters.

B.N.Z. welcomes enquiries from YOUNG PEOPLE If you are a young man on your way up in the world, ambitious for progress, you will reap many benefits from a B.N.Z. Cheque Account. You are invited to discuss with your nearest Bank of New Zealand Manager how a cheque account can help you.

BANK OF NEW ZEALAND

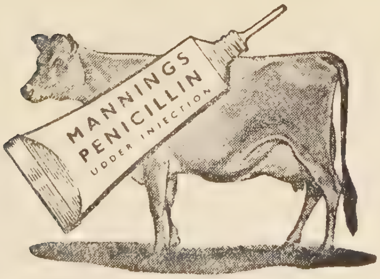
BANK WITH THE BNZ

The Dominion's largest trading bank—more than 370 Branches and Agencies in New Zealand

14.7E

MANNINGS

PENICILLIN UDDER INJECTION



FOR MAMMITIS

in three strengths

'25' '50' '100'

with the thin, smooth nozzle.

Available in either round or flat tins.

PROCAL PENICILLIN

MANNINGS
PROCAL
Hypodermic Penicillin

FOR SHEEP after assisted lambing, and *all farm animals*

Bloodpoisoning and Blackleg in Sheep, Footrot in Cows and Pigs, Arthritis in Lambs and Pigs.

3 strengths — '100' '500' '1500'. In flat tins with hypodermic needle.

been produced. This suggests that the initial problem is unlikely to persist if the growth of clover is encouraged by correct management of the sward.

White clover sown alone or with other clovers has given swards containing a proportion of undesirable grasses and weeds. As white clover is relatively slow in establishing itself, it is essential to include some grass seed to provide an initial close sward to suppress weeds. Results from pure sowings of red clover (cowgrass) have been still less satisfactory, weed invasion being encouraged by the short life of this clover species. Of other grasses and clovers included in mixtures, subterranean clover has not persisted under mowing. Browntop and Chewings fescue have also quickly disappeared from swards.

At this relatively early stage of orchard grassing in this country recommendations of seed mixtures can be only tentative. Observations to date suggest that the perennial ryegrass and white clover mixture is the most generally suitable, experience having shown that the final composition of the sward may be influenced by management to produce either a clover-dominant sward or one in which both species persist to a similar degree.

A mixed sward is probably desirable on rolling country, as pure clover swards when wet are reported overseas to cause skidding of tractors and other heavy implements. This has also been noted in Nelson orchards. The following seeds mixture is recommended (lb per acre):

	lb
Perennial ryegrass	16
Short-rotation (H1) ryegrass	8
Certified white clover ..	2

Short-rotation ryegrass has a life of two to three years and is included to give quick ground cover until the other species are fully established. A similar mixture, but with 2 lb of the deep-rooting Montgomery red clover added to give greater bulk of herbage for a few years, is proving very suitable for Auckland orchards. Where short-rotation ryegrass is included in a seeds mixture the new sward should be mown or grazed a few weeks after it becomes established to prevent the young clover seedlings being smothered.

Growers who may wish to establish a pure white clover sward are recommended to use the following mixture:

	lb
Italian ryegrass	20
Certified white clover	2

Italian ryegrass has a life of about two years and will give ground cover and suppress weeds until the clover is established. As this ryegrass makes vigorous growth, early mowing or grazing of the new sward, as recommended for short-rotation ryegrass, is essential.

Grasses that have not yet been investigated for orchard swards but are worthy of trial on a small area by growers include prairie grass and *Poa trivialis* (rough stalked meadow grass). Prairie grass is a deep-rooting grass which produces a large bulk of herbage in winter and would therefore not compete seriously with the trees for moisture at other seasons.

To maintain a good sward of prairie grass mowing or grazing is necessary during winter. Sowing at 20 lb per acre, with white clover at 2 lb, is suggested. *Poa trivialis* is mainly a spring and early summer grass. It is not a vigorous grower, but forms a close turf which is easily mown. Though it has a wide climatic range, it succeeds best on moister soils of above-average fertility. A mixture of *Poa trivialis* 10 lb and white clover 2 lb per acre is recommended for trial.

A strain of timothy known as S.50 is very popular for orchard grassing in England, where it forms a low, dense sward which grows chiefly from autumn to early spring, stands up to traffic particularly well, and requires less mowing than other grasses. However, S.50 timothy is not available in New Zealand, as for general farming purposes it is regarded as inferior to the type of timothy grown here, which is a vigorous, tall-growing grass producing an abundance of feed.

SWARD ESTABLISHMENT AND MANAGEMENT

Preparation for Sowing

A good sward will not be obtained if the ground is not adequately prepared for sowing. Preparation should consist of frequent cultivation in the summer preceding grassing to destroy weeds and secure a good tilth. As grasses require a well consolidated seedbed, cultivation should be shallow. Autumn sowing is preferable, as the sward is then well established by the time heavier traffic has to be carried. Weed growth is also less prolific in autumn. A further reason for autumn sowing is that a sward sown in spring may be adversely affected if the following summer is hot and dry.

An application of superphosphate broadcast at 2 cwt per acre is recommended just before sowing. Mixing the fertiliser with the seed is not advisable, as unless the seed is sown immediately after mixing its germination may be impaired.

Mowing

On New Zealand grassed orchards the rotary type of mower is used almost exclusively. Mowing is usually carried out from September to February, though some growers continue until early winter. On about two-thirds of the orchards under observation the grass was cut before it exceeded a height of 6 in. The average number of cuts last year in Auckland, Hawke's Bay, and Nelson orchards was 14, compared with an average of eight in irrigated orchards of Central Otago. The interval between mowings may be as little as 10 days in spring, increasing later in the season to one month.

Frequent cutting in spring and early summer is essential to reduce competition with the trees for moisture and also for the preservation of clover in both new and established swards. At this season of the year clovers require ample light and air, and they will be weakened or killed outright if shaded and smothered by grasses.

Therefore, to establish and maintain a clover-dominant sward mow frequently in spring and summer, cutting whenever the grass attains a height of 5 or 6 in.

During the hot summer months cutting too close to the ground should be avoided. The mower height should be adjusted to leave about 2 in. of sward after cutting. This will provide a cover of vegetation to keep the ground cool and will also further encourage the spread of clover by allowing it to produce foliage.

On the other hand, except during seasons of drought, cutting should be reduced to a minimum in autumn, when a cover crop would normally be growing in cultivated orchards. For trees in active growth some competition from the sward for nitrogen and moisture is beneficial at this season, as it assists in maturing the wood and improving the keeping quality and colour of the crop. Growth of the sward in autumn and winter is also necessary to build up the quantity and increase the depth of grass roots in the soil, as this is limited by the amount of top growth.

Fertilisers for Trees

That fruit trees in grassed orchards require heavier applications of nitrogenous fertiliser than those under cultivation has been known in England for many years and has also been demonstrated in recent trials in New Zealand (4). Being therefore forewarned by experience overseas, most growers here have paid particular attention to this requirement. Though it should be emphasised that the effect of grassing on fruit tree growth and cropping can be accurately determined only by precise measurement in field trials, observations made on the selected orchards indicate that where the nitrogen application has been increased to about double that given before grassing, growth and production are being well maintained and in several instances increased. On the other hand, though failure to increase nitrogenous manuring had an adverse effect on a few orchards, comparison has been complicated by the fairly general practice of grazing sheep on grassed orchards. This is discussed in the next section.

Increasing use is being made of non-acid nitrogenous manures of the ammonium nitrate plus calcium carbonate type in preference to sulphate of ammonia to avoid checking the growth of clovers.

Grazing

Grazing with sheep during winter is a common practice in most districts, Auckland excepted. Of the 35 orchards under observation no fewer than 17 are winter grazed. Orchards with swards of high clover content but which have not had increased quantities of nitrogenous fertiliser since grassing have suffered no apparent check to growth and production where sheep grazing is practised.

In four of the 17 orchards there is clear evidence of over-stimulation of trees by nitrogen, resulting in excessive growth and, in one instance, serious deterioration in the quality of the crop. Growers who graze their orchards are therefore advised to watch for signs of excess nitrogen, especially if the orchard is on fertile soil and the sward contains a high proportion of white clover.

Mulches

In Hawke's Bay orchards mulching under trees with threshed hay or other material is often associated with grassing, and reports indicate that this practice prevents any check to growth of trees newly grassed. The difficulty experienced in establishing "replants" in grassed orchards has also been effectively overcome in Hawke's Bay by the maintenance of a heavy mulch round the young trees, a procedure that could profitably be followed in other districts.

When to Grass

A definite answer cannot be given to the question of the age at which a young orchard should be grassed, as reliable information can be obtained only from field trials in which the growth of grassed and cultivated trees is compared. Such trials have not yet been carried out in this country. In England the grassing of trees under 5 years of age is not recommended and in view of the importance of ensuring rapid growth and the building of a strong framework in newly planted trees this is possibly the best advice that can be given here in the meantime. Certainly it may be said that grassing at an earlier age should not be considered unless mulching material is available at reasonable cost and the grower is prepared to mulch the young trees for a few years.

Effects of Grassing

In general grassing has had a favourable effect on the condition of pip fruit trees. In very few instances has there been a decline in vigour and on some orchards there has been a marked improvement. On the few orchards where an adverse effect on growth or crop was noted failure to increase nitrogen applications was the most commonly associated feature. On others a poor sward had been established.

The improvement effected by grassing in providing a better surface for orchard operations and thus more congenial conditions for the orchardist was obvious on all orchards. Soil erosion has been eliminated or greatly reduced and in some instances drainage was reported to have improved. Fears that grassed pip fruit orchards would suffer in dry weather have not been realised, as they have come through summer droughts equally as well as cultivated orchards. In irrigation districts water penetration and the water-holding capacity of the soil appeared to have increased after grassing. In Central Otago there have been no obvious indications that frost injury is more severe than on cultivated orchards. The influence of grassing on disease and pest incidence and on fruit quality has not yet been sufficiently observed.

So far as the effects of any cultural system can be assessed by observation only, grassing of pip fruit orchards has proved satisfactory where attention has been given to the known essentials of management.

References

(1) Waters, R. A. S., "Proceedings of the New Zealand Grassland Association", pp. 168-175, 1951.

(2) Waters, R. A. S., "New Zealand Journal of Science and Technology", A36, No. 5, pp. 516-525, 1955.

(3) Sears, P. D., "New Zealand Institute for Turf Culture: Report of Proceedings Greenkeepers Conference", pp. 13-17, 1951.

(4) Bollard, E. G., "New Zealand Journal of Science and Technology", A38, No. 5, pp 527-532, 1957.

◆

Radio Broadcasts for Farmers

RADIO broadcasts for farmers during May will be given as follows:

1YA Auckland, 7.45 p.m.

6 May—"Hydatid Control in Waitemata Area", by N. Harrison, Livestock Instructor, Department of Agriculture, Auckland.

13 May—"Wintering for More Wool and Lambs", by J. D. J. Scott, Instructor in Agriculture, Department of Agriculture, Ruakura Animal Research Station, Hamilton.

20 May—"The Animal Disease Situation", by C. Turbet, Veterinarian, Department of Agriculture, Auckland.

27 May—Talk by J. W. Woodcock, Director, Extension Division, Department of Agriculture, Wellington.

1YZ Rotorua, 7.15 p.m.

6 May—"Winter Feeding of Stock", by B. A. Gunning, Instructor in Agriculture, Department of Agriculture, Matamata.

20 May—"Cream Separators and Maintenance", by L. E. Downs, Special Inspector, Department of Agriculture, Hamilton.

2YZ Napier, 7.10 p.m.

5 May—"Potatoes", by A. J. Coughlan, Fields Instructor, Department of Agriculture, Hastings.

19 May—"Wool Faults Associated with Management", by R. W. Scaife, Sheep and Wool Instructor, Department of Agriculture, Hastings.

2ZA Palmerston North, 12.30 p.m.

11 May—"Potato Diseases", by J. A. Graham, Instructor in Agriculture, Department of Agriculture, Palmerston North.

25 May—"The Field Drainage Service", by K. L. Mayo, Instructor in Agriculture, Department of Agriculture, Palmerston North.

3YA Christchurch, 12.20 p.m.

4 May—"Experimental Work on Pastures", by J. Hercus, Agrostologist, Department of Agriculture, Christchurch.

18 May—Review of "The New Zealand Journal of Agriculture", by E. G. Smith, Instructor in Agriculture, Department of Agriculture, Rangiora.

4YA Dunedin and 4YZ Invercargill, 12.33 p.m.

4 May—"Feeding Stock in Winter", by C. A. Martin, Livestock Instructor, Department of Agriculture, Tapanui.

11 May—"Irrigation during the Past Season", by J. P. Widdowson, Research Officer, Department of Agriculture, Alexandra.

18 May—"Selling Wool", by W. F. Dick, Sheep and Wool Instructor, Department of Agriculture, Invercargill.

25 May—"Research in Northern Southland", by G. W. Nixon, Instructor in Agriculture, Department of Agriculture, Invercargill.

Regular Sessions

1XH Hamilton, Mondays at 12.33 p.m., Wednesdays at 12.33 p.m. (report from Ruakura Animal Research Station), Thursdays at 12.33 p.m.

1XN Whangarei, Mondays at 8 p.m. (Northland livestock report and "Farming for Profit"), Wednesdays at 8 p.m. ("Farming for Profit"), and Fridays at 1 p.m. ("News for the Farmer").

1YA Auckland, Mondays at 12.36 p.m., Tuesdays, Wednesdays, Thursdays, and Fridays at 7.45 p.m.

2XA Wanganui, Thursdays at 8 p.m.

2XG Gisborne, Tuesdays at 8.3 p.m., Fridays at 8 p.m. (Gisborne stock market report).

2XN Nelson, Thursdays at 8 p.m.

2XP New Plymouth, Thursdays at 8.1 p.m.

2YA Wellington, Mondays at 7.10 p.m., Thursdays at 12.33 p.m., Fridays at 7.10 p.m. (Feilding stock market report).

2YZ Napier, Tuesdays at 12.12 p.m. (Hawke's Bay orchardist session), Tuesdays at 7.10 p.m., Wednesdays at 7.15 a.m. (Hawke's Bay-Poverty Bay livestock market report), Thursdays at 12.33 p.m.

2ZA Palmerston North, Mondays at 12.33 p.m., Fridays at 8.30 p.m.

3XC Timaru, Mondays at 8 p.m. (Pleasant Point stock market report), Tuesdays (fortnightly) at 8 p.m. (Temuka stock market report), Wednesdays at 8 p.m., and Saturdays at 10.30 a.m.

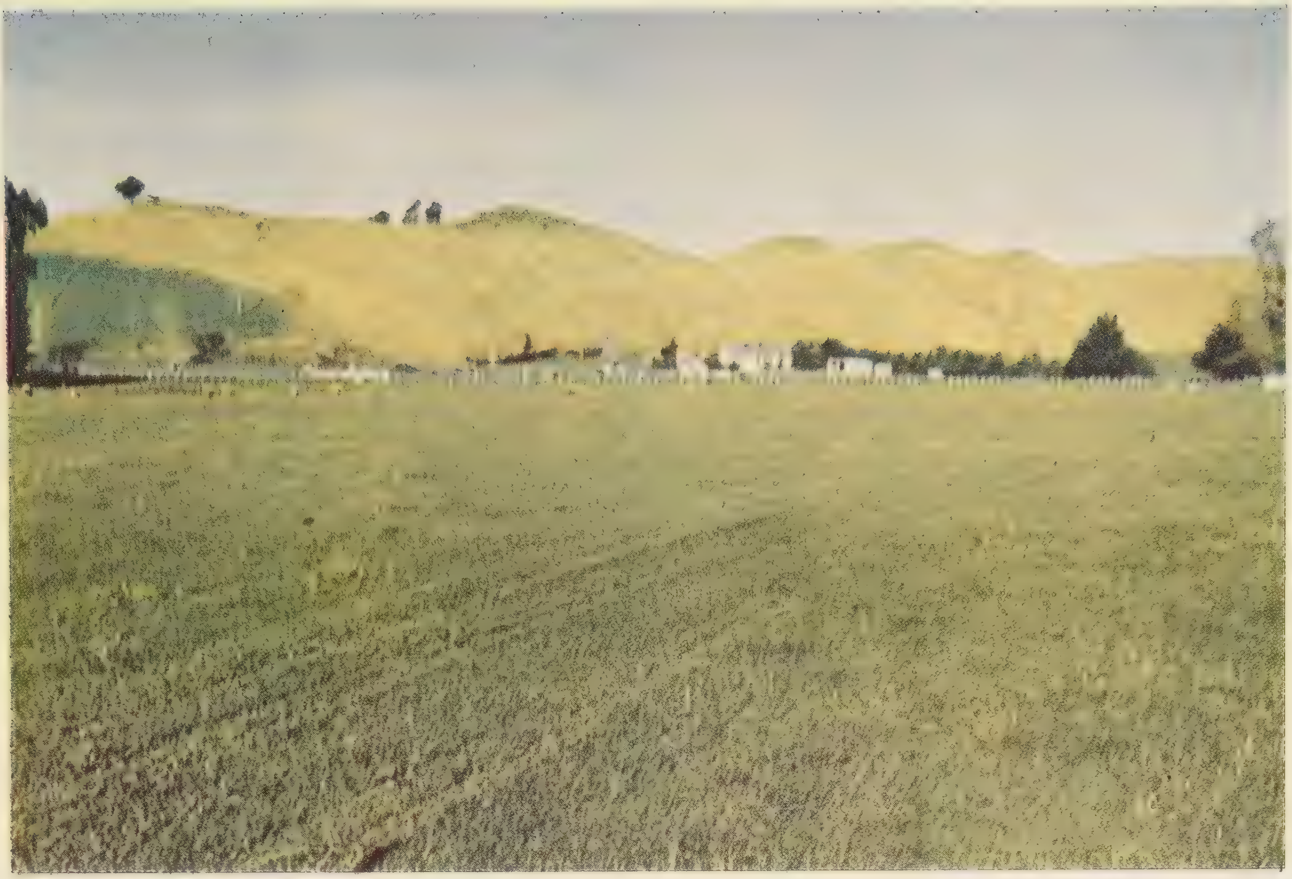
3YA Christchurch, Mondays at 12.20 p.m., Wednesdays at 7.15 p.m. (Addington stock market report), Thursdays at 12.33 p.m. and 7.10 p.m.

3YZ Greymouth, Mondays at 12.36 p.m.

4YA Dunedin, Mondays at 12.36 p.m., Tuesdays at 12.33 p.m., Wednesdays at 12.37 p.m. and 6.50 p.m. (Burnside stock market report), Thursdays at 12.33 p.m.

4YZ Invercargill, Mondays at 12.36 p.m., Tuesdays at 12.33 p.m. and 7.15 p.m. (Lorneville and Gore stock market reports), Wednesdays at 12.37 p.m., and Thursdays at 12.33 p.m.

◆



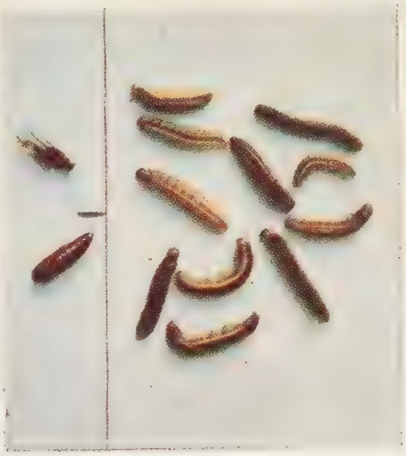
Green hills turned brown by army caterpillars on the coast near Wairoa.

Army Caterpillar Damage on East Coast Hill Country

By C. J. HAMBLYN,

Fields Superintendent, Department of Agriculture, Palmerston North

▼ Typical army caterpillars, showing at left a chrysalis and a parasitic ichneumon fly which destroys the caterpillars. The moths mate soon after they emerge from the chrysalids and the females lay up to 500 eggs in the folded blades of grass or cereal crops.



IN the late autumn of 1956 and again in the autumn of 1957 the army caterpillar appeared in devastating numbers on east coast North Island hill country. During these two autumns the caterpillars infested upward of 120,000 acres of steep hill pastures, stripped the country bare of green leafage, and left it open to invasion by such weeds as thistles, dandelion, and hawkweed. The army caterpillar, which is often referred to as army worm, is the caterpillar stage of a common native night flying moth. It has often devastated such crops as barley, maize, wheat, and oats in summer or early autumn, and in a number of districts has severely damaged pastures on river flats and swamp areas, usually after a summer flood followed by warm, muggy weather. In such visitations they have appeared in tall, rank pastures, which the moths have evidently found to be favourable places for egg laying, as they do the long grass of headlands and also the crops they attack.

ME?
I'll take
BLUE LINE
MILKER TUBING
every time!

- MORE FLEXIBLE
- "BUILT-IN" DOUBLE LIFE
- HYGIENIC PLUS!
- **Always ask for TOP-QUALITY**

NEW WHITE QUALITY STAYS WHITE THE WHOLE SEASON!

Skellerup
BLUE LINE
MILKER TUBING

Crack-proof BLUE LINE Claw Tubing has been scientifically tried and tested—proved without exception to be the last word in milking rubber. That's why it's specially marked with the BLUE LINE indelibly built into each tube. It stands out from ordinary milking rubber and stands as a guarantee of quality and satisfaction. BLUE LINE claw tubing stays CLEANER — stays whiter, more resistant to wear. Always ask for BLUE LINE and you get top quality! Also available in red and black.

Manufactured by
EMPIRE RUBBER MILLS LTD.

E.49

THE recent outbreaks described in this article were on a much bigger and more widespread scale than hitherto recorded in New Zealand

Districts Affected

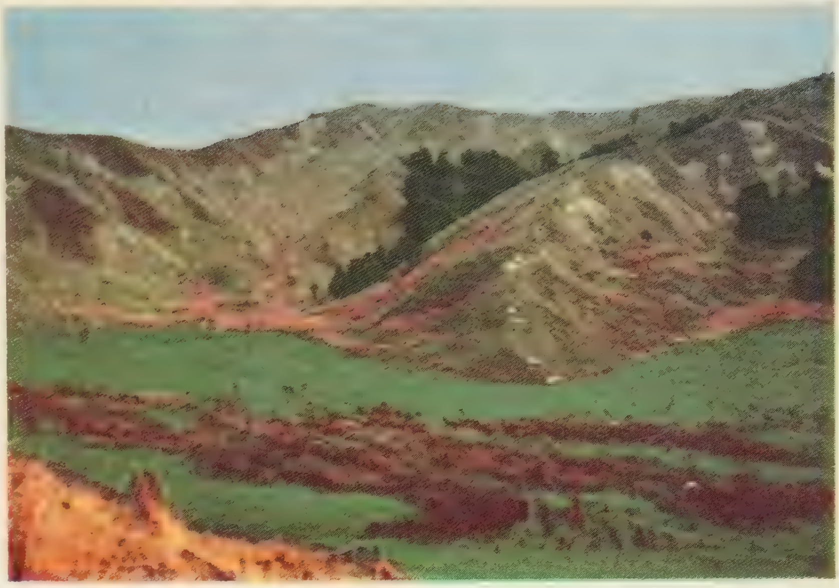
The caterpillars severely damaged some 3,000 acres of hill country pastures in Poverty Bay in 1956 but did not reappear in that area in 1957. Wairoa County, which experienced the most widespread infestation in 1956, where some [illegible] acres were ravaged, had less than 10,000 acres affected in 1957. In central and southern Hawke's Bay, however, where the damage in 1956 was confined to about [illegible] acres of [illegible] land, the area affected increased to some 30,000 acres in 1957 including [illegible] areas [illegible] rough [illegible] country.

A few minor, isolated outbreaks were reported in the Wairarapa in 1956, but in the autumn of 1957 more than 40,000 acres of [illegible] hill country was [illegible] made bare by very heavy infestations of the caterpillar. In line with the unpredictable habits of these [illegible] there were no reports of the presence of the caterpillar in large numbers in the autumn of 1958 anywhere on the east coast and it is quite possible that it may be a long time before they reappear in this country on the scale of 1956 and 1957.

Life History of Insect

Unfortunately the life history of the moths, of which the so-called army worm is the larval or caterpillar stage, has not been studied fully in the field nor have the origin and course of a typical army caterpillar outbreak been carefully followed and recorded. Two different insects appear to be involved, *Pseudaletia separata* and *Persectania ewingi*, both of which belong to the [illegible] large family of night flying moths, the Noctuidae.

The life cycle as far as is known is typical of this type of moth. The moths mate soon after emergence from the chrysalis in late spring and early summer and the females lay up to [illegible] eggs in the folded blades of grass or cereal crops. The eggs under favourable conditions soon hatch, and the larvae, at first small greenish caterpillars, proceed to feed and grow in the area where they are hatched. They pass through a series of up to six moults, shedding the complete skin.


Sunny faces only were attacked and shady faces and improved pastures were left still green and thriving.

When the caterpillars occur in very large numbers it seems that their feeding activities foul the feed and this causes them to start moving as an army in search of fresh clean feed. They like to climb up the stems and leaves of the plants they are feeding on, and they eat mainly at night, hiding at soil surface during the day. Their food requirements are quite small in the early stages, but when reaching maturity they can eat their own weight or more in a single night.

When fully fed the caterpillar goes into the chrysalis or resting stage, from which the adult moth emerges. Under favourable climatic conditions two or three full cycles are passed through in a summer and in the absence of, or when protected from, any or all of the natural controlling agents such as birds, insect parasites, bacteria, and fungous or virus diseases which attack the caterpillars, the population of moths can be built up enormously in a favourable season. When these moths proceed to lay eggs in hundreds the stage is soon set for a mass emergence of hungry caterpillars should favourable autumn weather cause these eggs to hatch. If the insects can overwinter successfully, the moth population at the beginning of the next season can again be very big and new massive caterpillar infestations likely.

The fact that two seasons of widespread damage such as those recently experienced have been followed by a year of freedom from the pest suggests that the controlling agents can be quick and very effective in keeping the pest from becoming an annual scourge.

The caterpillars apparently did not like clover pastures, as they were undamaged.

Features of Infestations

The recent visitations, beside being the most widespread and heaviest infestations of pasture lands by the army caterpillar so far recorded in this country, were remarkable in several other respects. Before the 1956 outbreaks were started, apparently by favourable autumn weather causing a mass hatching of eggs, there must have

▲ This pasture and the rushes and giant sedge were green before the army caterpillars attacked. The green patch at lower right is clover.

← Pasture damaged by caterpillars.

▼ This shows well how the caterpillars avoided the clovers.

been an unusual build-up in moth numbers during summer and some prodigious egg laying in the long roughage which they found suitable high in the hills. They always chose the sunny faces and they chose, for some unknown reason, areas of unimproved or very little improved hill country where there was plenty of roughage and cover for the eggs and the young caterpillars.

The first sign of trouble in the autumn of 1956 was the appearance about mid April of large patches of pasture which had turned brown high in the otherwise-green hills. The hills were generally green this autumn because of good summer and early autumn rains. These brown patches grew bigger every day and investigation showed that millions of army caterpillars, which had apparently started from small pockets and patches of roughage on the sunny slopes, were on the move eating out the green leaf of the grasses and chewing into the crown. They did not eat all the herbage, but their heavy onslaught on the plants so reduced vitality that the remaining leafage rapidly turned brown and eventually died off.

As the caterpillars moved outward and downward on the hills the areas of depleted pasture spread until in many areas the whole of the sunny faces of the hills showed the effect of their passage. The caterpillars prefer plants of the grass family, including the cereal crops, and the way in which they avoided patches of dominant clover pasture and even isolated clover plants was really remarkable. Their dislike of the clovers was perhaps the reason for their appearance only in unimproved pastures and for their not invading improved pastures adjoining the areas they were feeding in. Thus areas of sown pasture showing high fertility with plenty of clovers were not affected.

They also confined their feeding almost entirely to the sunny faces and generally the shady faces were not depleted.

The caterpillars continued active in the autumn of 1956 until well into June and in some areas up to the end of June. The 1957 outbreaks differed somewhat from those of 1956 in that the first appearances were some 2 weeks or more earlier, and because the country was much drier than in 1956, the typical browning of green herbage was not nearly so noticeable. The uneaten herbage did change colour, however, and the damage to plants was much more severe, a big proportion being killed.

Nature of the Damage

The autumn and early winter of 1956 were very favourable to pasture growth, and though the caterpillars cleaned up a considerable amount of cattle feed, they also cleaned out and opened up big areas of accumulated roughage on many of the unimproved hills. In some districts, notably Wairoa, the loss of cattle feed called for an adjustment of winter stocking, but generally pastures recovered well and no great harm was done.

The position was very different, however, after the much more extensive infestations in such districts as Hawke's Bay and the Wairarapa in the autumn of 1957. The caterpillars then became active after a prolonged dry spell which had already badly dried the pastures. Their activities, though starting earlier, persisted well into June, by which time the debilitated sward was unable to recover because of cold, wet conditions. Then in late spring, when such areas normally make good growth, drying winds took their toll, and the summer and autumn of 1957-58 were the driest in these coastal areas for many years. The effect of the drought on the feed position in the autumn and winter of 1958 on east coast hill country was bad enough, but on the big areas already depleted by the ravages of the caterpillar the result was really serious.

On the majority of hill country farms from the Wairarapa to Poverty Bay reductions in livestock carried were necessary, particularly of cattle, because of the exceptionally low rainfall and prolonged droughty conditions, but where the caterpillar had also affected pastures the reductions had to be much heavier than would have been necessary otherwise.

In many areas a further problem arose in that the opening up of the sward resulted in heavy infestation of large blocks of hill country by thistles of various sorts, flat weeds, and other weeds.

Remedies

There are at least two remedial measures to combat the caterpillars when pastures are attacked. They can be stopped in their tracks as it were by spraying with several of the new insecticides including DDT and dieldrin and either killed off completely or prevented from moving on to fresh areas. On areas fed over by the caterpillars the sward is opened up with much bare soil and these conditions are very suitable for successful oversowing, especially with clovers.

Several important features of the two large-scale outbreaks on east coast hill country either prevented successful use of either of these remedies or where they were used made the results generally uneconomic. In the 1956 outbreaks most of the damage had been done before farmers realised what had happened. However, quite a number were successful in stopping further movement on to fresh areas by aerial spraying round the perimeter of the advancing caterpillars. A band of some 50 to 60 ft. was sprayed with one pass of the aeroplane or helicopter. About half the band was applied on the advancing caterpillars and the rest to the pasture ahead. One of the main considerations in such cases was the fear that the caterpillars would move on to and clean out improved pastures in the valleys and lowlands adjoining the hills. As already stated, they did not do so even where no spraying was done.

Oversowing of Affected Areas

Only a few farmers took advantage of the conditions left by the caterpillars by oversowing with clovers and topdressing affected areas. Most hill country men considered it too late to oversow because it was well into June before the caterpillars stopped feeding. However, because of the favourable winter and spring those who did oversow were generally successful in getting a strike and satisfactory establishment.

The 1957 outbreaks were generally a little earlier and much more spraying was done, but here again by the time it was decided to act the caterpillars had already advanced over big areas of country and the cost of spraying was very high relative to results in saving feed.

Some quite successful oversowing was also done in some districts, but the extremely adverse conditions of the following spring, summer, and autumn killed off most of the young clover plants.

The fact that most of the country affected had never been topdressed before made the establishment of oversown clovers still more difficult so late in the season. The successful establishment of oversown clovers by one or two farmers who risked oversowing and topdressing infested areas in mid April when the caterpillars started to show up, and some 6 to 7 weeks or more before their active feeding stopped, indicated that this could be done safely, and so give the clovers much better conditions for establishment. The difficulty, of course, was in deciding what area to oversow, since no one knew just how far the caterpillars would go unless they were stopped by spraying with insecticide.

Effectiveness of Spraying

Though the spraying was effective, it was difficult to decide on the value of tackling such widespread and massive invasions of pastures. There is no doubt that the sprays used and the method of application were effective in stopping the further spread of the caterpillars, but the spraying was far too late, and the cost, relative to the type of feed saved on unimproved hill country, unduly high. But here again it was not known that the caterpillars would not move on to and clean up more valuable pastures adjoining the hills.

Effective sprays applied by helicopter or aeroplane per acre were: 1½ pints of 15 per cent dieldrin in 5 to 10 gallons of water, more water being used according to the rankness of growth; 2 pints of 20 per cent DDT in similar quantities of water.

The dieldrin was much quicker in action than the DDT, but the latter was quite effective. When the caterpillars were inactive for some days the insecticides took longer to act.

Possibilities of Early Spraying

The fact that the main hatchings of eggs, which gave rise to the immense populations of voracious caterpillars on the move in search of fresh feed, took place in relatively small patches of over-rank grass high in the hills some 2 or 3 weeks before the movement began suggests that had any of these infestations been noted and the danger appreciated at this early stage spraying of such areas would have been much less costly and far more effective in preventing damage. It would have been possible, also, had the early incidence of abnormal numbers of the small caterpillar been reported, to have given farmers in districts with similar climatic and farming conditions a warning to investigate the hills on their properties.

This should certainly be the procedure when infestations start in valuable crops such as barley, wheat, oats, and maize, where early action by spraying can save thousands of pounds.

It is quite possible, however, that by the time another visitation of the type and magnitude of those of 1956 and 1957 occurs again on the hill country of the east coast the lessons learnt on how best to combat this pest and remedy its damage will have been forgotten.

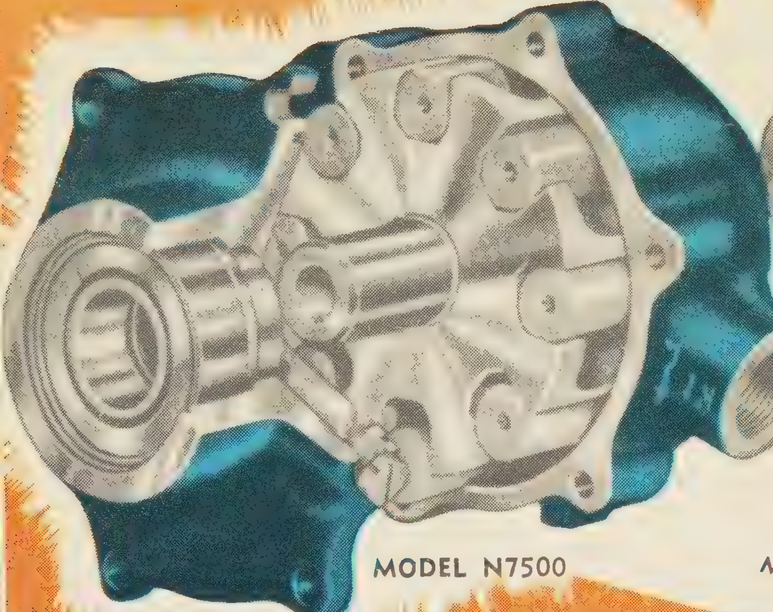
◆

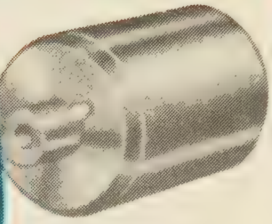
N.Z.'s most popular agricultural pump!

NEW PUMP FOR HIGH AND LOW PRESSURES

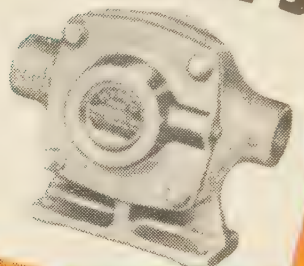
HYPRO

NYLON ROLLER BALL BEARING PUMPS

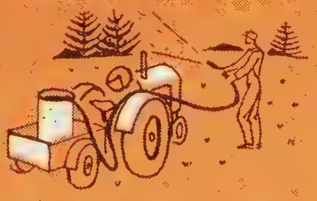




MODEL N7500



MODEL N6000

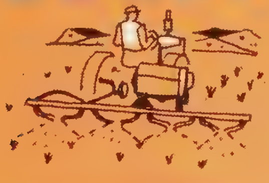


WEED SPRAYING

Designed for both high and low pressure use making the models N7500 and N6000 most suitable for pasture spraying as well as higher pressure spraying of gorse and blackberry, etc.

LIVESTOCK SPRAYING

HYPRO pumps are most suitable and economical for the new sheep sprayers. They provide ample pressure and volume for either tractor or independent engine drive. For livestock spraying they have the pressure to drive the spray material through the hair or wool and thoroughly cover the hide.



INSECT CONTROL

Both pumps have ample volume and pressure for insect spraying through either the boom type sprayer, or cluster jet equipment. Use it to spray weeds in pastures and to control insect pests on crops.

GENERAL FARM USE

Spray barns for fly control; flush out pig pens, poultry houses; clean cattle trucks and other farm machinery. HYPRO pumps do all these jobs and hundreds more with volume and pressure to spare.

HYPRO PUMPS
are available in the following models

N7500 giving pressures up to a maximum of 350 lbs. per sq inch

N6000 giving pressures up to a maximum of 200 lbs per sq. inch.

N1500 is a larger pump giving 150 lbs. per sq. inch maximum pressure with considerably greater volume

These 3 models are equipped with the famous exclusive

Nylon Rollers.
The new **Model 700** series is the revolutionary irrigation pump ideal for tractor drive.

Write for the Hypro handbook showing all the details of these models.

Also available, pressure control units, booms, guns, hose and all auxiliary equipment.

Available from Stock and Station Agents, Tractor Dealers, Dairy Companies etc.

Australasian Distributors for Hypro Engineering Inc., Minneapolis Minn., U.S.A.

FRANK M. WINSTONE (Merchants) LTD.

P.O. Box 2195, Auckland.

TVL QUALITY

is your safeguard

TVL
'PHENOTAS'
Registered
DRENCH
TASMAN VACCINE LABORATORY LIMITED, BOX 29, UPPER HUTT

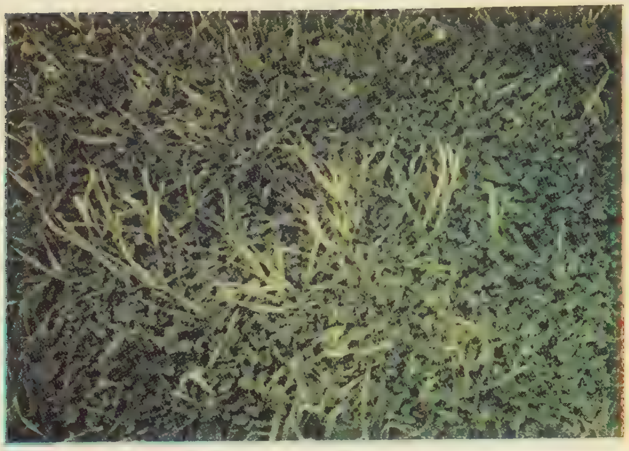
'PHENOTAS'

Registered

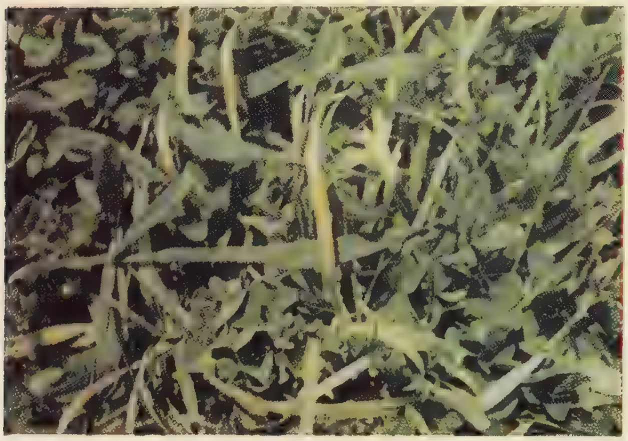
'PHENOTAS'—the TVL brand of Phenothiazine, is produced by the Tasman Vaccine Laboratory under the same stringent conditions of scientific control as all the well-known TVL Vaccines.

TVL TASMAN VACCINE LABORATORY LIMITED

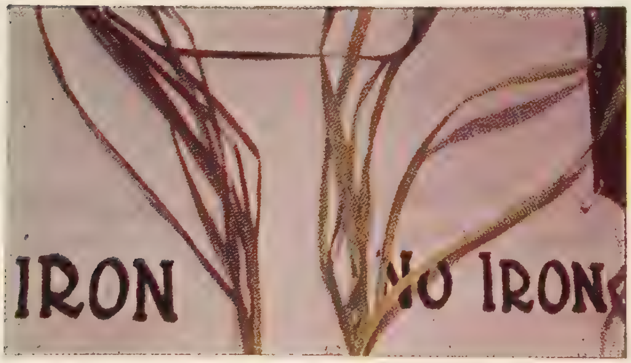
IRON DEFICIENCY IN TIMOTHY AND COCKSFOOT ON PEAT



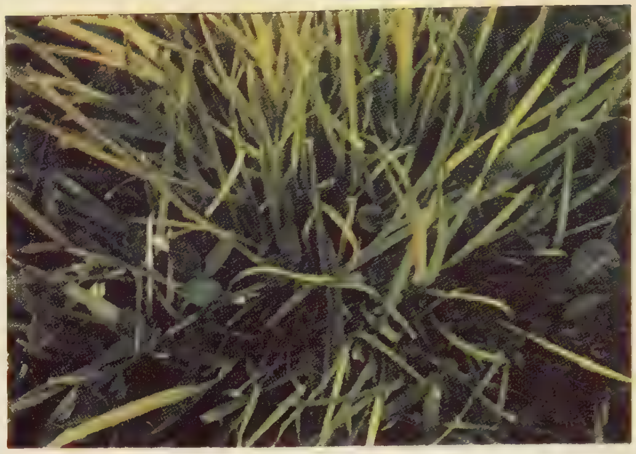
Typical yellowing of leaves in timothy which is a striking symptom of iron deficiency.



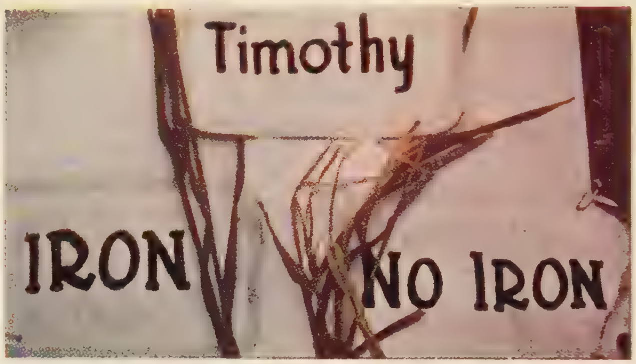
Badly affected timothy plant.



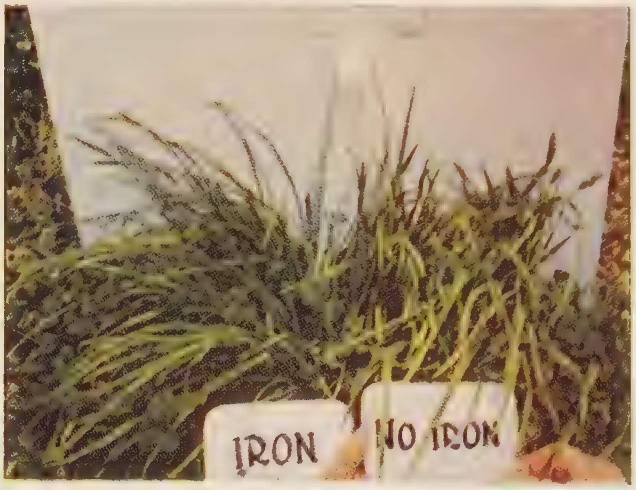
Treated (left) and untreated (right) cocksfoot leaves 14 days after the treatment was applied.



Cocksfoot and timothy showing symptoms of iron deficiency.



Treated (left) and untreated (right) timothy plants 14 days after the application of iron chelate. The stripes are typical symptoms of iron deficiency



Half of a single cocksfoot plant was sprayed with iron chelate, the other half being left untreated. The photograph was taken 10 days later.

Recent Research Work

Responses to Iron and Nitrogen on Peat

IN the early stages of the research work on the development of peat land at the Department of Agriculture Rukuhia Soil Research Station it was shown that the peat was deficient in minerals and available nitrogen and that outstanding pasture responses were obtained when the major plant nutrients were applied. Because of the way the peat is formed it was expected that it would also be lacking in other elements. Later experimental work showed that applications of copper sulphate produced big increases in the growth both of crops and pastures. More recently trials have shown that some pasture plants respond to applications of iron.

DEFICIENCY SYMPTOMS IN PASTURES

GROWTH on newly developed peat areas is usually very slow in early spring. Wet and cold conditions and the acute deficiency of available nitrogen in the peat are the main factors limiting growth at this time of the year. It is possible that other factors are also involved and therefore the pastures on an experimental peat area were observed carefully during the critical spring months. During spring 1957 a chlorosis of the leaves of cocksfoot and timothy plants was noticed. Part of the green colour from affected cocksfoot had disappeared and the plants were not growing as vigorously as was to be expected. The badly affected timothy seemed to be dying and nearly all the leaves had turned white.

The illustrations on the opposite page show the appearance of typically affected cocksfoot and timothy plants. The symptoms suggested iron deficiency, but various mineral applications were tried. Iron chelate applied as a foliar spray at the rate of 40 lb. per acre was the only treatment which had any effect on the chlorotic plants. About 10 days after the treatments the affected plants turned green and produced new growth which was vigorous and healthy.

IRON CHELATE

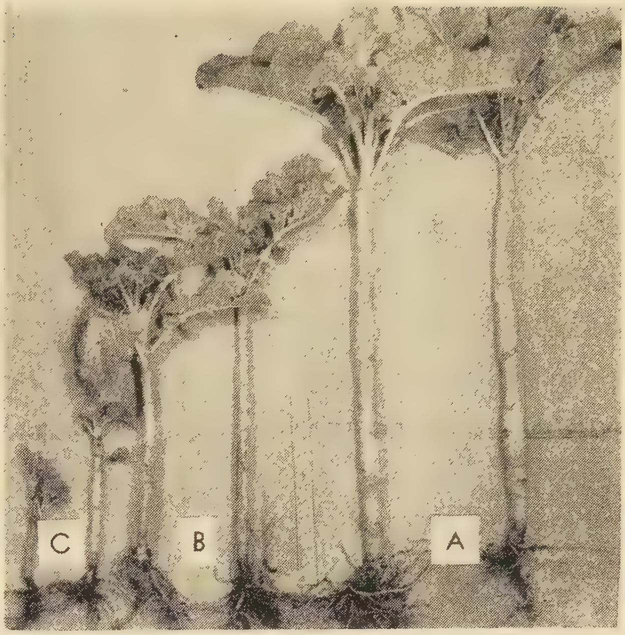
Chelates are organic compounds capable of combining with metals such as iron. Chela means claw. The metal is held and protected from firm fixation in the soil and the plant can absorb the chelate with the combined metal. Iron chelates are commonly used to cure iron deficiency in fruit trees.

On mineral soils which usually contain large quantities of iron in a relatively unavailable form, chelating agents not containing iron may be used to free some of the iron locked up in the soil and make it available to plants, but it is not certain whether there is sufficient total iron in the peat to enable a chelating agent to work in this way in the absence of added iron. In this trial the iron complex with ethylene diamine tetra-acetic acid containing 8 per cent of iron was used.

TRIALS WITH IRON CHELATE

A replicated mowing trial was begun on 10 December 1957 on the affected area. Half the plots were untreated, and the other half received an application of 40 lb. of iron chelate per acre. The immediate effect of the treatment was not only a change in colour of the pasture but an increase in the growth. On 8 January the plots were cut and weighed, and the treated plots yielded 27 per cent more pasture than the untreated plots. A further cut on 18 March showed an increase of 18 per cent. The final cut in May did not show any yield differences between treated and untreated plots.

The deficiency symptoms which showed up so clearly in the spring had disappeared by the beginning of January, and there were no longer any visual differences between treated and untreated plots. Presumably during spring the amount of iron in the peat available to these plants was insufficient, but under the conditions in summer sufficient became available.



Differences in a chou moellier crop, showing the after effect of ploughing down clover before sowing.

Further trials were begun in spring 1958 in which different forms of iron and iron chelate at varying rates were applied in order to investigate the duration of the effects and the efficiency of the different materials.

NITROGEN RESPONSE FROM CLOVER IN CROPS

Peat land is generally deficient in available nitrogen, the effect of this deficiency often being very conspicuous in crops.

The effect of nitrogen was spectacularly demonstrated on a farmer's crop of chou moellier which was sown following a crop of turnips the previous season. The paddock was sown in turnips in three sections: (A) with 3 lb. per acre of white clover seed, (B) with 1 lb. of clover, and (C) without clover. The turnip crop on all three sections was similar and there was not much evidence of the clover when the turnips were grazed by sheep in January and February. When the paddock was closed after grazing the turnips, the clovers formed a dense cover on section A, whereas on section B there was patchy clover growth and no clovers at all on section C. The clovers were grazed off in April and the paddock again closed until early August when it was set stocked with 10 ewes and lambs per acre until November.

The paddock was then ploughed and sown in chou moellier. At the time of ploughing there was a dense growth of clover 6 in. high on section A. The effect of the clovers as a source of nitrogen for the chou moellier crop is clearly shown in the photograph above. Section A had an excellent crop of chou moellier, whereas on section B there was only a medium crop. The crop on section C where no clovers were sown was practically a failure.

—*F. C. C. HUPKENS VAN DER ELST*

Danger of Using Arsenic-treated Timber for Beehives

By D. L. HARRISON, Senior Scientific Officer, T. PALMER-JONES, Principal Scientific Officer, and R. G. NAIRN, Technician, all of the Department of Agriculture Animal Research Station, Wallaceville

TESTS carried out at Wallaceville have shown that wood preservatives containing arsenic are poisonous to bees and lead to serious reduction of the honey crop. Arsenic-treated timber should on no account be used in beehive construction if serious losses are to be avoided.

THE common practice among apiarists is to seal and paint the outsides of beehives and leave the inner surfaces untouched. It is obvious that when treated timber is used for building hives bees will be continually exposed to the chemicals remaining on wood surfaces after treatment or contained in the hive dust and condensed surface moisture. The effect of these chemicals on bee health and possible contamination of the honey are two factors of primary importance to the beekeeper. Field tests in which three commonly available wood preservatives containing arsenic were used were designed to study these problems at Wallaceville Animal Research Station, and the results obtained are discussed in this article.

WALLACEVILLE TRIAL

PRE-CUT hive parts of *Pinus radiata* sufficient for four 3-storey hives were treated with preservatives, dried thoroughly, and assembled (see table at right). The outsides only were sealed with primer and two coats of lead-free paint. The hives were set up in line along the edge of the main apiary and strong colonies and brood headed by young queens installed in each. Four hives chosen at random from the general apiary were used as controls.

TREATMENT OF HIVES

Hive number	Preservative	Composition
1, 2	Tanalith U	Fluor-chrome-arsenate with dinitrophenol
3, 4	Boliden S 25	Zinc, copper, chrome-arsenate
32A, 32B 33, 34	Untreated controls	

The trial was begun in December 1954 at the beginning of a honey flow. Mortalities in the Boliden-treated hives were not excessive until the honey flow tapered off late in February. From then on the numbers of dead and dying bees which accumulated at the entrances of hives 3 and 4 were abnormally high.

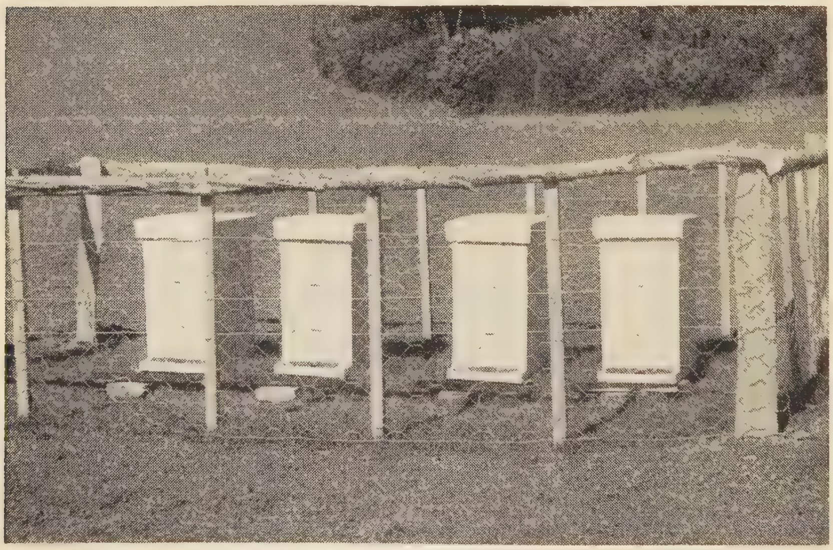
The Tanalith-treated hives 1 and 2 did not show excessive mortalities compared with the controls. Unfortunately robbing was particularly severe early in the new year. Hive 2 was almost completely lost and was removed from the experiment to prevent further attack; hive 4 suffered considerable loss of honey from the same cause.

The dead and dying bees ejected daily from all hives were counted for one month beginning in May. Counts showed that abnormally high mortalities were still occurring in the Boliden-treated hives 6 months after establishment. Losses from the Tanalith hives were no greater than from the controls.

Chemical analyses for arsenic were made through May and June on weekly collections of dead bees from the four random controls, the hives treated with preservatives, and the four untreated hives nearest the latter in the apiary. The level of arsenic in bees from treated hives 1, 3, and 4 was high and consistent with death from arsenic poisoning. Bees from all control hives contained more than the normal content of arsenic, which showed that considerable robbing of stores and drifting of bees had taken place between the treated hives and the controls.

Analysis of Live Bees

During the removal of the season's honey crop bees in individual hives were anaesthetised, washed free from surface dust, and analysed for arsenic. The results showed clearly that all bees in every hive built of arsenic-treated wood were still ingesting considerable quantities of preservative 6 months after the trial started.



An isolated group of beehives under observation at Wallaceville after treatment with an arsenic wood preservative.

Analysis of the Honey Crop

Four core samples were taken from every frame with a 1 in. cork borer along a diagonal and perpendicular to the foundation comb. Weighed portions for analysis were taken after all the cores from each hive had been pooled, melted, and homogenised. These samples included cappings, honey, pollen, foundation comb, cell wax, and the occasional bee. The main honey crop and cappings honey were extracted as in normal commercial practice, the burr and brace combs being included in the cappings.

The only significant amount of arsenic found was in the cappings honey from hive 4 (Boliden), which contained 0.13 parts per million of arsenic trioxide. All other samples contained 0.05 parts per million of arsenic trioxide or less, with traces only in the controls. These levels are well below the tolerance of 1.5 parts per million of arsenic trioxide permitted in foodstuffs under the New Zealand Foods and Drugs Act.

Source of Arsenic

By feeding bees the honey in full combs removed from the Boliden-treated hives it was shown that though the arsenic level of the bees was raised above normal, the arsenic in the combs was not the major cause of the high mortalities in the experimental hives.

In a further test the inside surfaces of a disassembled Boliden hive were sprayed with water and the washings collected, evaporated, and fed to bees in sugar syrup. Bee mortality was higher in this test and the arsenic content of the live colony bees was approximately five times that reached in the first test over the same period. This indicates that hive dust and condensed moisture are the main source of poison within the hives.

KAITOKE TRIAL

A second and more comprehensive trial over a 2-year period was made in which 12 hives constructed from timber treated with Tanalith U, Tanalith C (a copper chrome-arsenate), and Boliden S 25 were used. Whereas in the Wallaceville trial treatment with chemicals was done on the pre-cut hive parts, in this trial the timber was treated in the rough-sawn state, dried, machine dressed, and then cut into the various hive components and assembled. The outsides were sealed with primer and given two coats of lead-free paint; the inner surfaces were left unsealed as previously. Four hives treated with the same preservative were grouped together and the three groups placed several hundred feet apart.

Colonies and brood were introduced into the Tanalith U and Boliden hives in July 1956, and into the Tanalith C groups in October. The soil near the hives was tested and found to be free from arsenic. No arsenic compounds to our knowledge were used during these tests in the areas visited by the bees.

Abnormal numbers of deaths soon occurred in both the Tanalith U and Boliden hives. Dead bees collected during the first fortnight from both groups had very high arsenic contents. The main symptoms shown by the affected bees were weakness and incoordination, which are typical of poisoning by arsenic.

Colony strength was so depleted in the Boliden group that one hive did not survive and the complete honey crop from the other three was lost. The Tanalith U group, after the initial mortalities, built up steadily and the first season's honey crop removed in autumn was satisfactory. The Tanalith C hives, which were started in late spring, appeared quite normal during the first season, though one hive was lost through robbing.

As in the Wallaceville tests, only traces of arsenic were found in the main honey crops; the cappings honey from Tanalith U and Tanalith C groups contained 0.10 and 0.05 parts per million of arsenic trioxide respectively.

The second season proved disastrous for all hives, though every effort was made to help them to survive. Throughout the year heavy losses of bees occurred in all hives, especially during the cold winter months. Mortalities were so severe that the hives could not defend themselves and they were continually under attack by bees from other areas. The three remaining Boliden hives had ceased to function by March 1958.

Throughout the trial analyses of the collected dead bees from all treated hives showed conclusively that mortalities were due to poisoning by arsenic derived from the hive timbers.

By August only one Tanalith C and two Tanalith U hives had survived, all in a weakened condition. Chemical analysis of live bees from these three of the original 12 which survived the 2 years of the trial showed their arsenic content to be abnormally high.

Though the total effect in the Tanalith C hives was the least severe, both live and dead bees from this group contained considerably more than the normal level of arsenic. In the absence of other common causes the dying out of this group can be due either directly or indirectly only to arsenic poisoning.

It is clear that machine dressing of the treated timber was not effective in preventing losses in any of the three groups.

CONCLUSIONS

When treated with wood preservatives containing arsenic both pre-cut timber and timber subsequently machine dressed has been shown to be toxic to bees and to reduce honey yield seriously. The ingestion by bees of arsenic compounds from the inner-hive surfaces continues for at least 2 years after treatment. Contamination of honey with arsenic is negligible. Bee mortality, however, is severe, especially during the cold months of the year, when moisture condensation on the inner-hive surfaces is greatest. The consequent demoralisation within the hives leaves them open to attack by robber bees, and this was a feature in both trials.

Reduction in hive strength might be overlooked for a time in commercial apiaries particularly if the hives were surrounded by long grass and weeds. Such hives when inspected would be found in a weakened condition with depleted stores of honey. Hives could be in a similar plight through poisoning with agricultural chemicals or through the effect of certain bee diseases. The only means by which poisoning by arsenic can be definitely established is by chemical analysis.

Whether hives are decimated by poisoning in a single season (as in the Boliden group) or whether they are weakened to such an extent through the effects of the poison that they are subsequently robbed of all their honey (as in the Tanalith groups) the end result in both cases is the same as far as the beekeeper is concerned.

While the decay resistance qualities under field conditions were excellent, it is considered on the evidence presented that wood treated with arsenic preservatives should on no account be used in beehive construction.

Safe Preservatives for Beehives

Pentachlorophenol is safe for use in beehives according to Dyce (1951) provided the bottom boards and other hive parts with which the bees come into contact are piled outdoors and adequately ventilated for at least a week or two. This allows the volatile solvents to evaporate. Another writer (1954) states that pentachlorophenol is satisfactory for treatment of hive timber provided the timber is thoroughly aired before use; otherwise there is a danger of injuring the bees.

Copper naphthenate, copper chromate, and boric acid should also be satisfactory provided the hives are thoroughly dried and ventilated before use. Creosote should not be used, as it causes honey taint.

Acknowledgments

The authors wish to record their thanks to Hickson's Timber Impregnation Co. (N.Z.) Ltd., Auckland, and to the New Zealand Forest Service's Forest Research Institute, Rotorua, for their cooperation and for supplying the treated timbers.

References

"Treating New Beehives", "Gleanings in Bee Culture", vol. 82, p. 238, 1954.

E. J. Dyce, "Wood Preservatives and their Application", "American Bee Journal", vol. 91, p. 192, 1951.

Care of Livestock during May

Contributed by the Animal Research Division

BLOOD POISONING IN HOGGETS

BLOOD poisoning in hoggets grazing on turnips is becoming an increasingly important problem. Deaths occur from infection with the blackleg organism, which probably gains entry through the mouth. An excellent vaccine, which confers very good immunity, is available for purchase in New Zealand. On properties where losses have previously been experienced, hoggets should be vaccinated at least a fortnight before they are placed on turnips. The nearest Veterinarian or Livestock Instructor should be consulted concerning the method of vaccination.

AUTUMN-SAVED PASTURE

In most districts there is still time to provide good winter grazing by shutting up paddocks and letting them grow during autumn and early winter. Having some pasture cover on paddocks before the first frosts will assist pasture growth during winter. Autumn-saved pasture is invaluable for early calving cows. It also provides the best insurance against sleepy sickness in ewes. If necessary, feed silage to cows now to enable some paddocks to be shut up. Once the ewes have been tupped they are all the better for being done fairly hard until 3 or 4 weeks before lambing. This also will enable some paddocks to be spelled.

INOCULATION OF DOGS AGAINST DISTEMPER

Distemper in dogs can in a very high percentage of cases be prevented by vaccination. This is best done when the pups are 3 to 4 months old.

UNTHRIFTY CALVES

The best feed for calves is good fresh pasture, and this can be provided by rotating the calves through the cow paddocks. Good-quality hay is necessary to supplement the sappy young autumn pasture. At the first sign of unthriftiness calves should be drenched with phenothiazine, being given the full dose recommended on the label. Drenching, however, will not be effective unless the calves are properly fed.

PREVENTION OF SUCKING BY CALVES

Sucking of each other by calves is a habit which should be broken as soon as it is detected. The insertion of a bull ring is effective in most cases.

MILKING MACHINE OVERHAUL

As soon as the cows have been dried off arrangements should be made for the milking machine to be overhauled by an expert. Do not install complicated gadgets, but make sure that all parts of the machine are working efficiently. This will not only ensure rapid, trouble-free milking, but is likely to increase production and will help to reduce mastitis.

RED WORMS IN HORSES

Red worms can seriously reduce the efficiency of working horses and are responsible for many deaths in foals. Phenothiazine is a very effective remedy, but is best given under veterinary supervision, as in certain conditions it may prove dangerous. Treatment should be given before winter.

Pasture Production and Weed Control

Seasonal Notes by the Extension Division

WITH the increased amount of hill country topdressing done during the last few years the need for the best use of the extra feed produced is becoming increasingly apparent. Subdivision will assist in making better use of this feed.

SUBDIVISION OF HILL COUNTRY

SUBDIVISION of hill country should be planned to facilitate easy access from paddock to paddock so that stock can be shifted with minimum disturbance. The provision of bulldozed tracks can sometimes help tremendously in this respect. The aim is to make stock graze where required rather than where they themselves fancy.

Shady faces need to be fenced from sunny faces to enforce fern control on the shady faces. Steep sidelings if possible should be fenced from easier slopes and flats, and newly sown pasture must of course be fenced from established pasture. In practice the fences should be situated mainly along the easier ridges and to some extent along the floors of gullies. Where it is possible to operate a tractor care must be taken with the positioning of fences so that sufficient manoeuvring room is left at the tops and bottoms of slopes. Access to water also has to be taken into account.

There is no set formula for determining the number of paddocks as long as there are sufficient to enable areas to be spelled four to six weeks after being grazed for up to one week. Up to 20 paddocks would be desirable to simplify management and ensure maximum benefit from mob-stocking, though excellent results have been achieved with considerably less than this number.

—*G. L. BANFIELD, Thames*

* * *

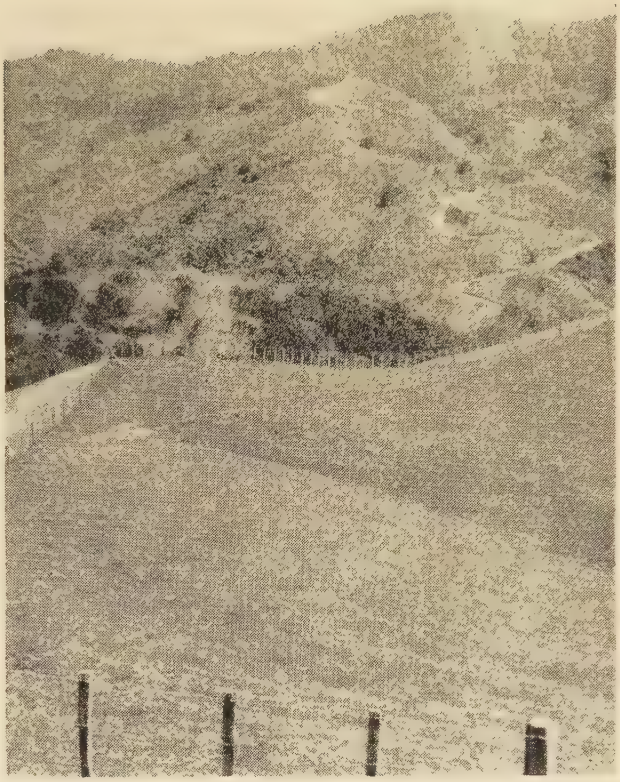
BUTTERCUP CONTROL ON WINTER WET SOILS

DAIRY farmers on heavy, wet soils who are troubled with buttercup in their pastures should eradicate the seedling plants now, as it may be October or November before they are able to get equipment on to their paddocks.

About ½ lb acid equivalent as contained in one pint of 3.6 lb acid equivalent ethyl ester of 2,4-D is sufficient to kill seedling buttercups and will severely check or kill seedling docks. For giant buttercup, salts of MCPA should be used at up to 1 lb acid equivalent per acre, as 2,4-D preparations are not effective on this species.

In newly sown pastures MCPB should be used once there is complete ground cover, which occurs usually six to eight weeks after the new grass has been sown. The rate of application in this case is up to 1 lb acid equivalent per acre.

Eleven gallons of water per acre usually gives a good coverage and ensures an even kill of the weeds. Most spray booms have nozzles spaced at 14 in. intervals, and to achieve 11 gallons per acre a pressure of 30 lb per square inch, using a 32 fan nozzle and travelling at 4 m.p.h., will be necessary. Farmers can check their units by putting in the tank a known quantity of water, spraying an acre, and checking the amount of water remaining in the tank. Too much water and weedicide can mean clover damage; too little leads to a poor and uneven kill.



—*D. A. NEWMAN, Dargaville*

* * *

KILLING DOCKS IN YOUNG PASTURES

WHERE docks are prevalent on the farm young pastures are often heavily infested with both seedling docks and regrowths from pieces of old root which have survived the cultivation work. The hormone weedkiller 2,4-DB applied at from 1 to 2 lb acid equivalent per acre has proved to be very effective in eradicating both seedlings and regrowth from root pieces without doing any harm to the clovers and grasses in the young sward. The treatment gets rid of most of the other weeds too.

Spraying should be done as soon as the ground cover is complete and when the seedling clovers have reached the first true-leaf stage. Fine, warm weather at the time of spraying, with no rain for at least 24 hours after treatment, is essential for success. Should rain fall after spraying, the treatment should be repeated. It is also essential to get the hormone on to every dock plant, and for this reason it is often necessary to give a light, quick grazing before treatment, so that the docks are fully exposed to the spray.

Though the hormone weedicides are ineffective in the treatment of old docks in established pastures, the treatment of docks in young pastures with 2,4-DB will give the young grass a clean start.

—*S. H. HENRY, Stratford*

An Efficient Rush Digger

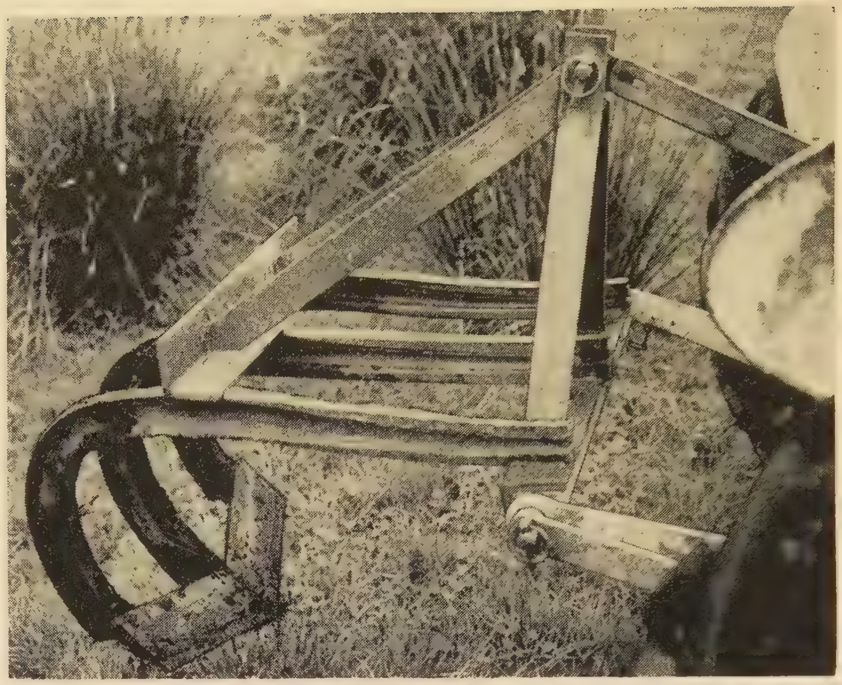
THE hand digging of rushes with a sharp spade has always been a laborious and unpopular task. A very efficient digger which has been designed and operated by Mr W. L. Johnston, Haurua Road, Otorohanga, for use on his tractor hydraulic system is described in this article by W. L. Osborn, Instructor in Agriculture, Department of Agriculture, Te Kuiti.

THE digger is built from three plough beams that have been connected together at 9 in. spacing by a V-shaped cutting blade as illustrated. The blade is shaped from 4 x ⅜ in. steel and the cutting edge is sharpened. Where no stones are present hardening of the blade is unnecessary. The unit is attached to the three-point linkage and the angle and operating adjustments are readily made on the top link and by hydraulic control. The completed implement cost less than £7 to build, but Mr Johnston had considerable difficulty in finding plough beams. He suggests that the two outside beams could have been made from heavy angle iron. The simple construction is illustrated.

To tackle large rushes or in heavy going the implement requires extra weight to give more bite. A sack of sand tied on to the framework gives more penetration. This weight could be built into the unit by using heavier beams. Also more ballast is required on the front end of small tractors to prevent rearing-up. Mr Johnston found that he did not require grippers fitted on the rear wheels, because the weight applied to the rear by the pulling action gave sufficient traction to stall the motor before the wheels could spin on dry land.

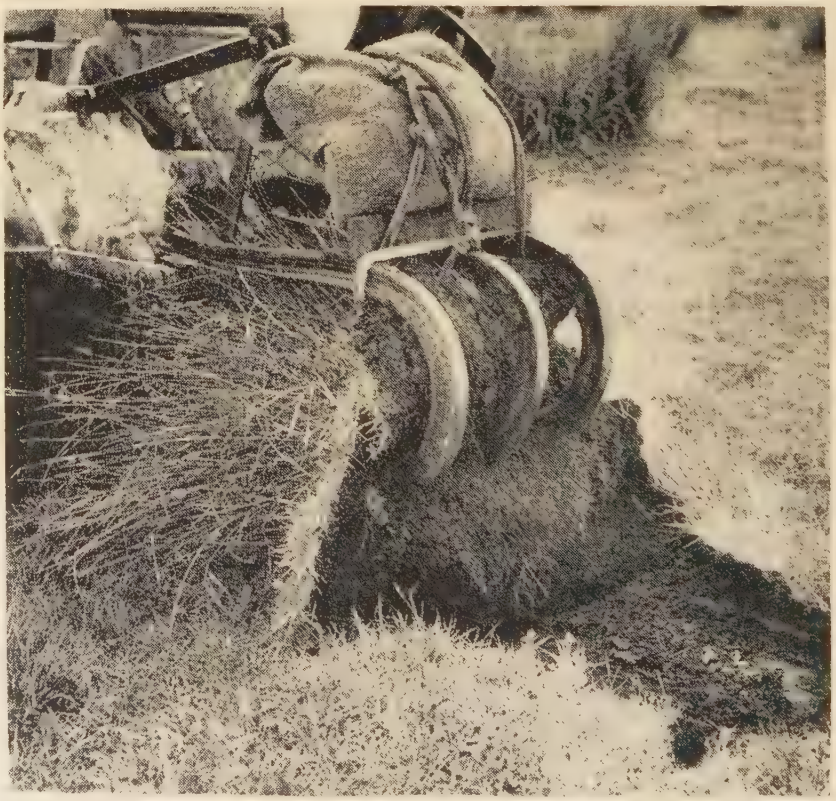
The paddock should be hard grazed by sheep, as long grass will tend to increase drag and clog the digger. One acre heavily infested with large rushes can be dealt with in about two hours, Mr Johnston using his small tractor. In time most of the pulled rushes rot and disintegrate. Some will root again, but no sign of regrowth from the remaining roots left in the ground after digging were found. Mr Johnston uses a buckrake to collect pulled rushes, and deposits them in low places. If the area is disced for a crop soon after digging, the dying rushes are soon chopped up by discs.

The implement is simple in design yet very effective and quick in action and could be easily adapted to the hydraulic systems and horsepower of different tractors.



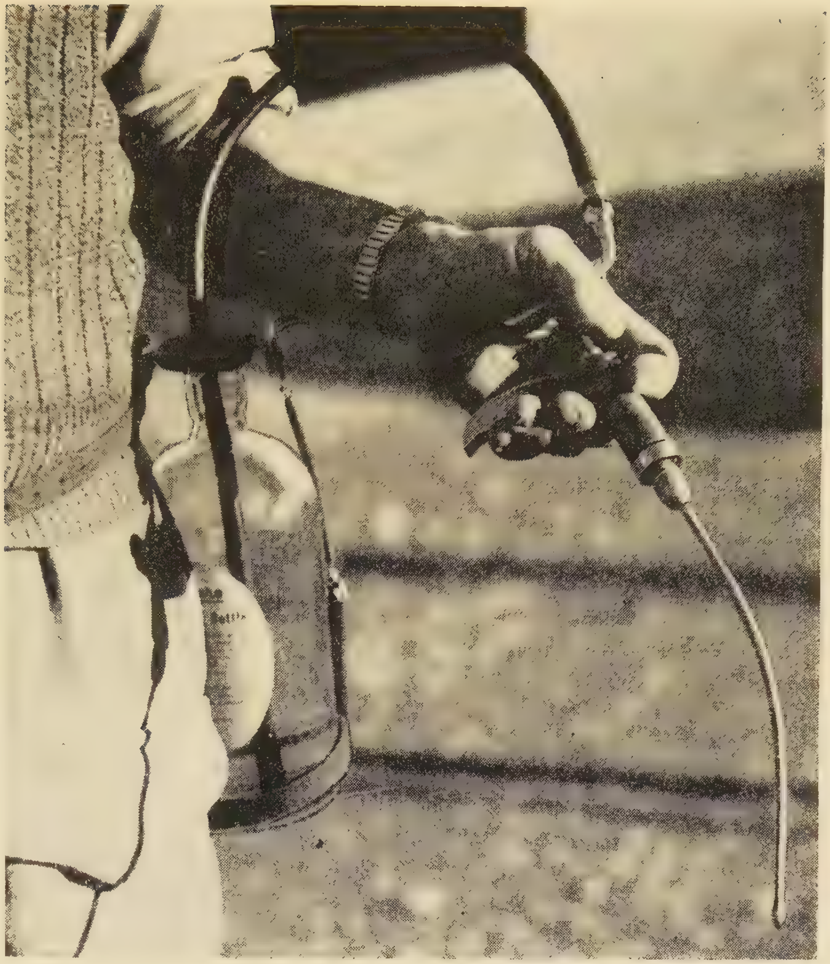
The digger is very simply constructed.

▼ To give the digger more bite a weight or a sack of sand or shingle is placed on top of the beams.

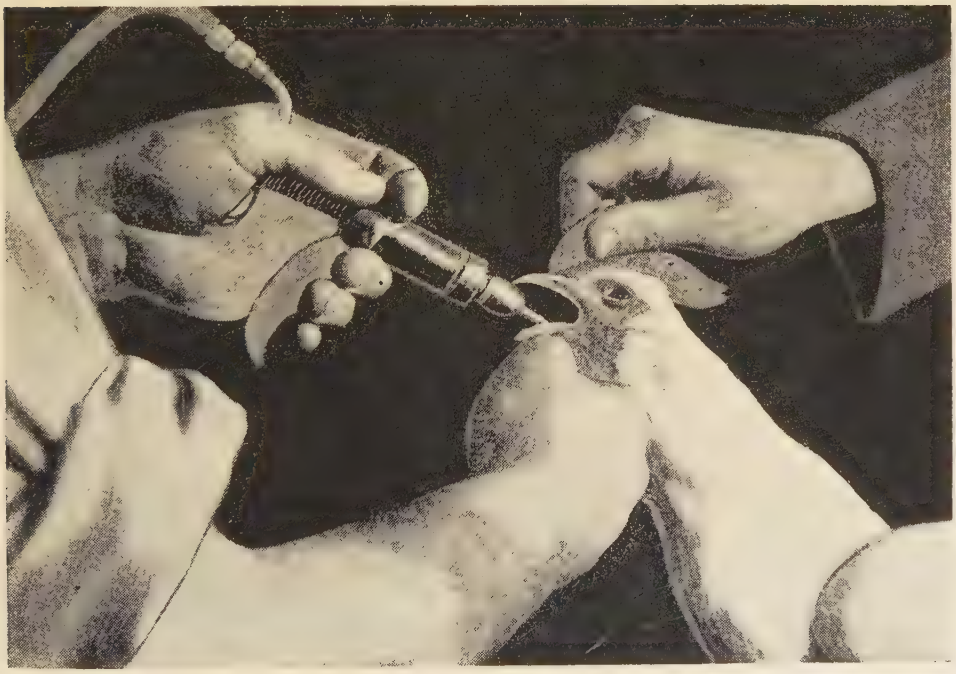


Parasitic Worms in Poultry

THOUGH most poultry producers are aware that poultry suffer from parasitic worms, not all appreciate how much harm these parasites can cause. Some become careless of the need to keep worms under constant control. This article by the Animal Industry Division, Department of Agriculture, sets out practical points which should be known by all poultry producers.



▲ Drenching gun suitable for use with carbon tetrachloride. The container is strapped to the operator.



← A bird being dosed for round worms. Its head is held by an assistant.

UNTIL birds are heavily infested they show few symptoms of a worm burden. Worms rarely cause severe mortality in poultry. Thus birds may be even moderately infested without the owner's knowledge and it is not until numbers have built up and damage has been done that trouble is suspected.

Worms may be the cause when young birds fail to thrive, in particular when they appear anaemic with pale faces, or when feather condition deteriorates, appearing dull or lacking

NEW

DOUBLE STRENGTH

ANTI-COAGULANT

RAT KILLER

TRIMORT

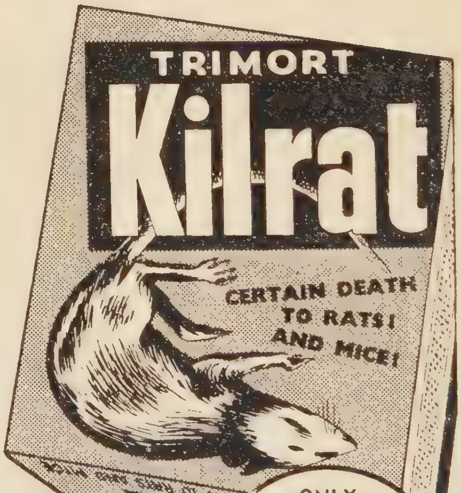
Kilrat

CERTAIN DEATH TO RATS AND MICE

Kilrat is the SAFEST rat killer to use where there are CHILDREN, DOGS, CATS and POULTRY

The new anti-coagulant rat killers are recommended by Civic Health Authorities because they are the safest and most effective. Newly-developed Trimort Kilrat is the most economical anti-coagulant rat killer you can buy—with the extra advantage that Trimort Kilrat kills both rats and mice. You use Trimort Kilrat just as it is, straight from the big economical 1 lb. packet . . . and best of all Trimort Kilrat goes on killing. The effectiveness of Trimort Kilrat lies in the secret that rats and mice continue to eat the bait without feeling any effect until they have consumed enough for a fatal dose. Rats and mice never develop any resistance to this amazing, scientifically formulated rat killer. For certain elimination of rats and mice use double strength Trimort Kilrat—the most economical anti-coagulant rat killer you can buy.

AVAILABLE IN ECONOMICAL BULK SIZES, 7 LB., 14 LB. AND 21 LB. TINS.


TRIMORT
Kilrat
CERTAIN DEATH TO RATS! AND MICE!

COMPARE THIS PRICE

ONLY

3'9

1 lb. PACKET

Scientifically prepared by qualified chemists at

TRIMOL LABORATORIES LTD., 71 Melrose Road, Mt. Roskill, Auckland.

in lustre. Birds suffering from worms lose appetite and production falls in laying pullets.

Harm Done by Worms

The harm done by worms is twofold. Direct harm is done to the bird in irritation of the lining of the intestines and a loss of nutrients to the worms. Of equal importance is a loss of constitution and a lowering of resistance to disease, a point all too often overlooked. Even a moderate infestation may lower a bird's resistance to diseases such as coccidiosis and leucosis. Thus worm control is one of the first steps in the prevention of diseases in poultry.

Causes of Worm Infestations

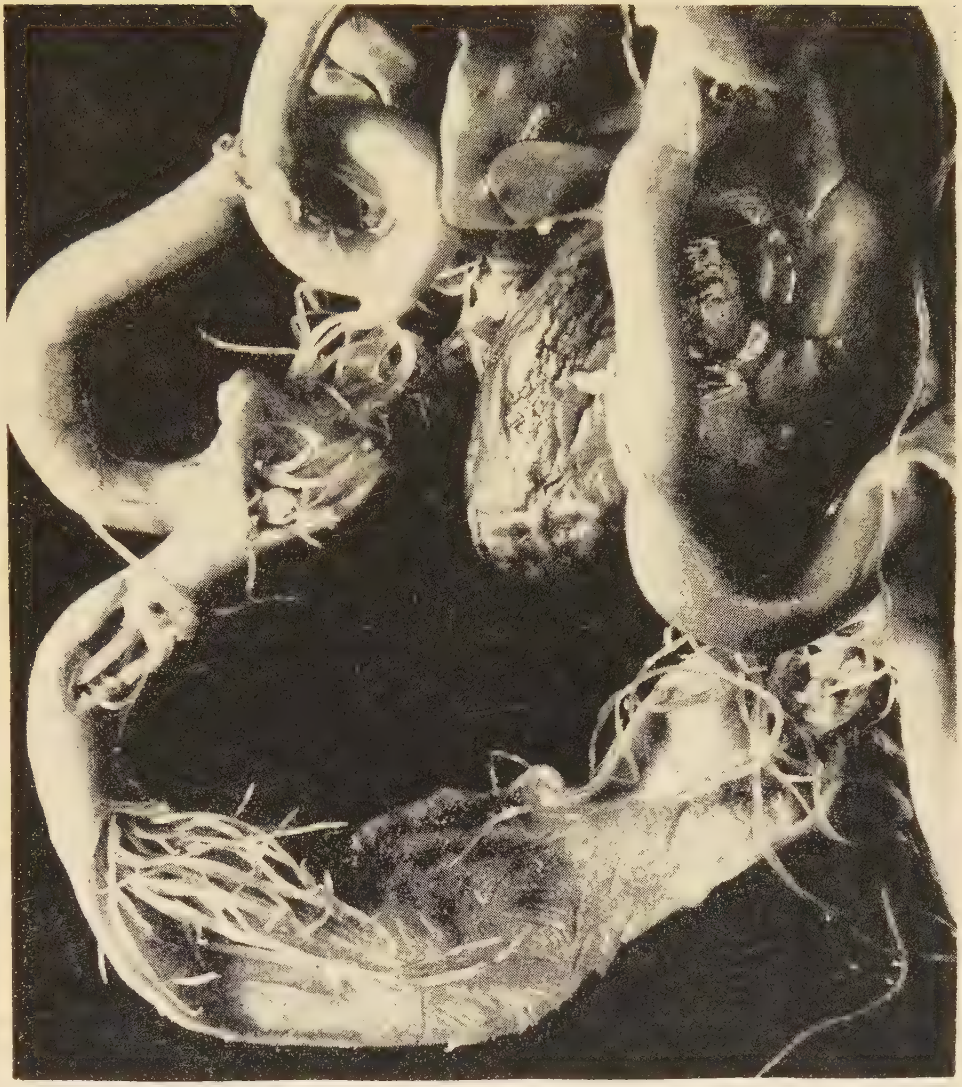
Worms, more particularly round worms, are commonly found in poultry in New Zealand, but poor management largely encourages worm multiplication and heavy infestations. A combination of the following conditions favours infestation:

1. Overcrowding stock, whether growing or laying pullets.

2. Dirty and particularly damp litter enables worm eggs to survive for long periods.

3. Long grass and damp ground where droppings fall are favourable for worm eggs.

Parasitic worms do not multiply in the digestive system of birds. Worm eggs are voided in the droppings and after a time if picked up by other birds, they develop into worms, thus spreading the parasites or increasing the burden in already infested birds. Overcrowding of birds will increase the concentration of droppings and greatly increase the chances of a build-up of infestation. It often leads as well to damp and dirty litter, giving conditions favourable to worm egg development. Overcrowded and badly managed outside runs afford similar conditions for the development of heavy worm infestations.



The intestine of a fowl cut open to show a heavy infestation of round worms.

4. It is unwise to run young stock with adult birds. The older birds may be carrying worms, but without indications, and the young stock may become infested and seriously harmed, as they have little resistance to worm trouble.

5. Birds are more prone to worm infestations if they are being fed a poor ration, more particularly if the feed is low in animal protein and vitamin A.

Control of Worms

Where conditions are average or above a poultry producer has only himself to blame if the poultry suffer from worms. The exception is tapeworm infestations, which are neither easily prevented nor cured, but fortunately they are not common. Avoiding overcrowding, dirty conditions inside and outside the houses, mixing of young and old stock, and incorrect feeding are the first steps in good management, which will reduce the chances of trouble from worms.

As well as good management the routine treatment of worms is strongly recommended. It is an insurance against trouble to dose poultry every year.

Large Round Worms

The commonest species of worm in poultry in New Zealand is the large round worm. Greyish-white, it measures up to 5 in. long. It is found in the intestine and is easily recognised.

Treatment for the worm may be carried out in several ways.

Individual Bird Treatment

The individual treatment of birds is the most effective method, because a known dose is given per bird, but the method entails handling every bird and so takes time and labour. Therefore as more satisfactory drugs have become available for mass dosing, treatment of individual birds has declined. However, for small numbers of birds individual handling is highly effective.

Carbon tetrachloride is used for individual treatment and can be done in two ways.

1. **In capsule form:** Capsules containing 1 c.c. of carbon tetrachloride are given by hand to each bird, one 1 c.c. capsule for birds of 2 to 4 months and two 1 c.c. capsules for all birds over 4 months.

The capsules are particularly suitable for dosing household poultry or small sideline poultry flocks.

2. **Liquid carbon tetrachloride from drenching gun:** An automatic drenching gun deposits the liquid directly into the crop. The dose is similar to that given by capsules. The guns must be used with care. Drops of carbon tetrachloride must not be allowed to fall in the mouth or throat near the opening to the windpipe, because if the fumes from the liquid enter the windpipe they will rapidly kill the bird. This danger is minimised if the gun is used carefully and is kept in good order. Trouble results if the valve is not working efficiently and a few drops of liquid fall off the end of the injector pipe. The local Poultry Instructor will demonstrate the correct use of these guns.

It is desirable to starve birds overnight before they are dosed with carbon tetrachloride.

Mass Treatment

Mass treatment may be done either by putting a drug in mash or in the drinking water. Both methods are satisfactory, though the addition of it to drinking water has added advantages. Birds suffering from worms tend to lose appetite and consequently a bird with a heavy worm burden may fail to eat sufficient mash to ensure an adequate intake of the drug. Normally a bird which has lost its appetite will continue to drink and so is more likely to obtain the required dose. Again, more work is required to mix a drug into mash efficiently as against adding it to the water.

The practice, once common, of feeding nicotine sulphate in wet mash as a cure for worms had the disadvantage of being rather too severe on the birds, deaths among young growing stock sometimes resulting. Proprietary worm powders are now available which contain nicotine sulphate and phenothiazine on a bentonite base. These can be incorporated in dry mash and do not have the same severe effects as liquid nicotine sulphate.

The drug used in the drinking water is piperazine and is available as a proprietary product. It is simple to use and effective against round worms.

With a worm powder or fluid the directions for dosage issued by the manufacturers should be read carefully and carried out.

When to Dose for Worms

The recommendation that deworming of poultry be carried out as an annual routine, even if the presence of worms is not suspected, is an effective safeguard and well worth the cost. Few producers today neglect to blood test their breeding stock against possible outbreaks of pullorum disease in chickens, and dosing regularly for worms should be regarded in the same way.

Dosing young growing stock at 10 to 12 weeks of age and the pullets again immediately before housing them in their laying quarters does not involve much extra work if the dosing is done in the drinking water. In districts where fowl pox is experienced and vaccinating stock is a normal routine, dosing for worms before vaccination is an essential, if a setback from vaccination is to be avoided.

Caecal Worms

Caecal worms are small whitish round worms up to ½ in. long found in the blind gut. They are quite common in fowls and when present in small numbers are harmless. Only large numbers in young birds cause any serious irritation in the caeca. The worms can carry the organism which causes blackhead in chickens. In recent years blackhead, previously considered to be mainly a disease of turkeys, has caused considerable trouble in young chickens. Consequently the control of caecal worms has become more important, particularly on farms where blackhead has occurred.

Control is similar to that recommended for the large round worm, but phenothiazine is the most effective drug and is included in the worm powders used against large round worms.

Tapeworms

Tapeworms fortunately are not nearly as prevalent in New Zealand as round worms. The species most frequently found is about 1/10 in. long and is difficult to see. Behind the head are a number of flat segments which become progressively wider. The segments contain eggs and those at the posterior of the worm break off and pass out of the bird. The head is equipped with hooks or suckers which are firmly embedded in the lining of the intestine of the bird and therefore tapeworms are not free in the intestine as are the large round worms. Eggs voided in the segments are harmless until they complete part of their life cycle in insects, slugs, or snails. When the last named contain the larvae of tapeworms and are eaten by birds the life cycle is completed and new tapeworms produced.

No satisfactory treatment of poultry for tapeworms has been found. Drugs which remove round worms are not effective, as they fail to remove the tapeworm heads. These heads grow new segments and are therefore a continuous source of trouble.

Gapeworms

Gapeworms are frequently referred to in overseas literature, but so far have not been found in chickens in New Zealand. It is a worm found in the windpipes of chickens and turkey poults. Poultry producers alarmed if they see birds gaping, will find that the cause of the trouble is something else.

◆

Complete Guide to "Journal" Since 1910

A COMPLETE guide to the mass of authoritative material that has appeared in the "Journal" since the first issue appeared in 1910 is contained in the Consolidated Indexes available from Publications Section, Box 2298, Wellington. The indexes cover the periods 1910-20, 1920-30, 1930-40, and 1940-50, and each of the four volumes is available at 10s. a copy.

If you have kept old "Journals" for years back, a Consolidated Index of them will save hours of searching for half-remembered references and will introduce new possibilities of usefulness and interest for these back copies.

◆

Forage Cropping in Matamata County

By B. A. GUNNING,
Instructor in Agriculture,
Department of Agriculture,
Matamata

Thrifty hoggets being wintered on swedes near Tokoroa.

THOUGH forage cropping is undertaken principally as an adjunct to pasture renewal, to cash in on the period under the plough, it can play an important part in filling in gaps in pasture production. In Matamata County two main periods of inadequate pasture growth occur—in the dry months of January to March and in winter. By raising carrying capacity in these crucial periods forage crops can raise production for the whole season.

MATAMATA County is an intensively farmed district. The 260,000 acres farmed are about equally divided between dairying and fat lamb raising.

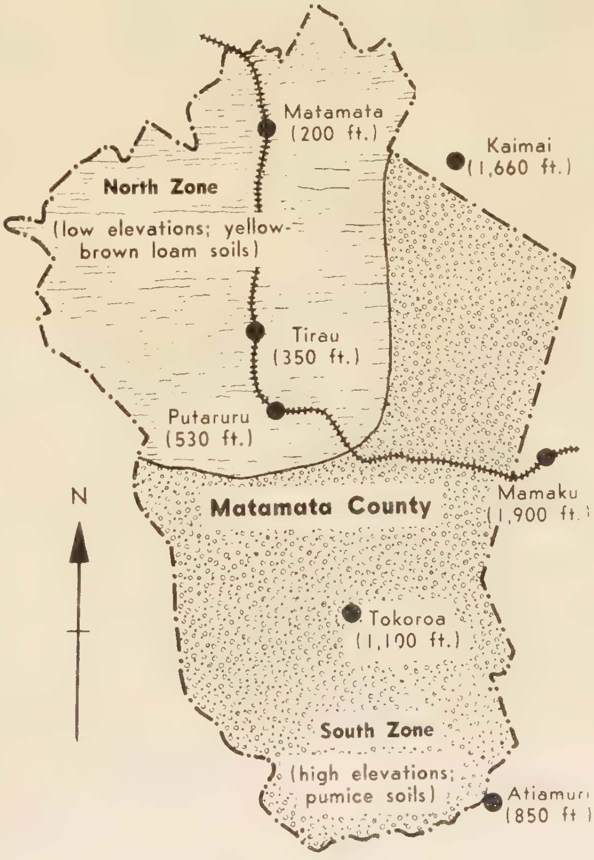
About 8,000 acres are cropped each year, almost all being in forage crops for cattle and sheep.

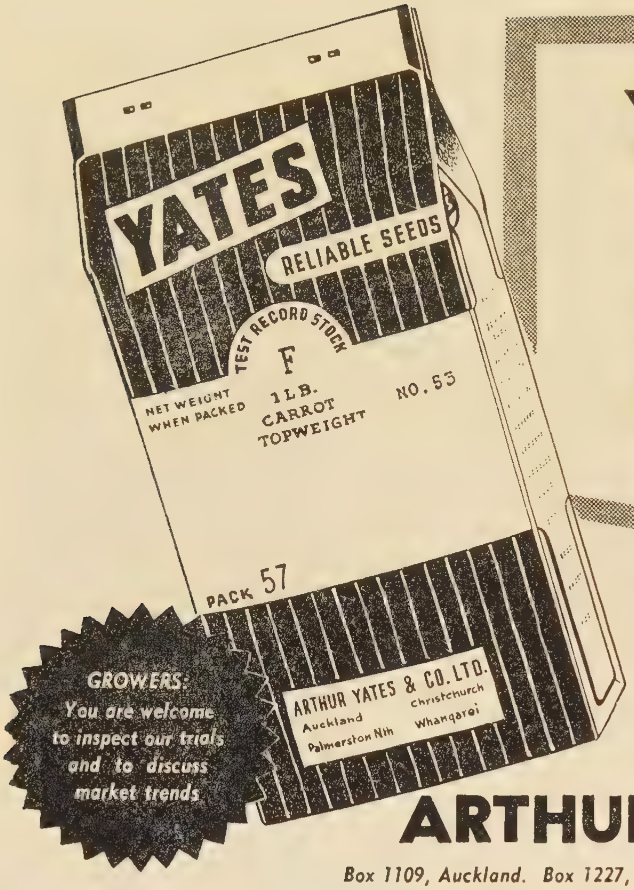
There are two main soil and climatic zones in the county. North of Putaruru the soils are all free-draining yellow-brown sandy loams of volcanic origin. This zone has a long farming history, and soil fertility has been raised to a point where pastures of ryegrass and white clover thrive with only a small proportion of other constituents.

South of Putaruru and on the Kaimai Hills and the upland Mamaku Plateau these soils have been overlain by the much more recent pumice soils from volcanic material of low natural fertility. Though these soils respond well to phosphatic and potassic manures, development of the region into a prosperous farming area was delayed 50 years, pending the discovery of cobalt as the solution to bush sickness. A lesser build-up of soil fertility here means that only some ryegrass is found in the pastures, which at certain seasons are notably clover dominant. From Putaruru (530 ft.) there is a rise of altitude to Tokoroa (1,100 ft.) and a marked deterioration of the winter climate is noted as one moves south. Cooler temperatures and poorer pastures cause spring growth to begin at Tokoroa a month later than at Matamata. Many dairy farmers at the southern tip of the county feed out for nearly 6 months over the colder months.

The saving of autumn pasture for winter and spring use is not the complete answer to the winter problem of this area. Saved pastures of cocksfoot and clovers tend to frost burn, and though Yorkshire fog supplies much useful feed, it soon becomes unpalatable and deteriorates as a milking feed for dairy cattle and ewes. To compensate for the long winters, however, there is generally satisfactory growth from pastures during summer in this south zone. The three factors responsible for this condition are the better summer rainfall than in the north zone, the water-retentive, vesicular nature of the pumice soil, and the suitability of soil and climate to the growth of such summer growing species as cocksfoot and red and white clovers.

In the north zone the position is reversed. Perennial ryegrass-dominant pastures, usually with a high proportion of short-rotation ryegrass, and often with a considerable amount of prairie grass, provide excellent winter




YATES
RELIABLE SEEDS
TEST RECORD STOCK
F
NET WEIGHT WHEN PACKED
1 LB.
CARROT
TOPWEIGHT
NO. 53
PACK 57
ARTHUR YATES & CO. LTD.
Auckland
Christchurch
Palmerston Nth
Whangarei

GROWERS:
You are welcome to inspect our trials and to discuss market trends

Yates Sealed Pack Seeds

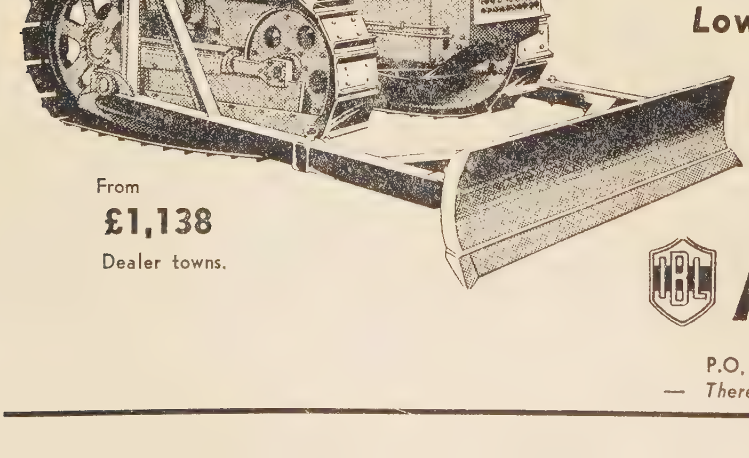
- ✓ Germination tested
- ✓ Trial Ground tested
- ✓ Market favourites

ARTHUR YATES & CO. LTD.

Box 1109, Auckland. Box 1227, Christchurch. 26 King Street, Palmerston North. Box 102, Whangarei.

In DIESEL or PETROL

Bristol '25'



From
£1,138
Dealer towns.

Lowest capital cost
Lowest maintenance
Lowest running costs

These three factors, plus outstanding performance, make the Bristol the tractor for today's economic conditions. Diesel or petrol models—available with or without blade.

IBL *Ivory Bros. Ltd.*

P.O. BOX 1321, WELLINGTON, and at AUCKLAND
— There's an Agent in your area for sales and service —

feed. An extension of the practice of saving autumn pasture to as much as three-quarters of the farm area on dairy farms, and large proportions also on sheep farms, has meant that the supplying of winter feed has been relatively easy in this zone of mild winter climate.

Owing to the ability to grow winter feed the carrying capacity of many dairy farms in the Matamata region has been raised to almost a milking beast per acre, with all herd replacements also carried on the farm. As carrying capacity has risen the summer feed position has become more difficult.

Place of Forage Crops

Forage crops are capable of relatively high yields in a short growing period. White-fleshed turnips, for instance, are the lowest yielding of the crops commonly grown in Matamata County. Even so, an acre of turnips yielding 30 tons will produce sufficient feed for 10 dairy cows for 6 weeks, supplying all the animals' maintenance requirements and their requirements for the production of ½ lb. of butterfat per day. To maintain production of 1 lb. of butterfat per day this ration would need to be supplemented by a limited amount of pasture, or pasture and silage. Approximately three-quarters of the animals' feed, however, is derived from the crop, so that over the 6 weeks total production from the crop can be reckoned as three-quarters of 420 lb. of butterfat (10 cows at 1 lb. per day for 42 days), or 315 lb. of butterfat per acre.

In growing the crop the paddock is out of grass for about 6 months.

The yields from most of the other commonly grown crops compare favourably with that of turnips.

The average per acre yields and dry matter contents of some commonly grown summer forage crops are:

Crop	Yield per acre tons	Dry matter percentage
Turnips ..	25-30	8
Chou moellier	30-40	12
Maize	40-50	15

It is easily seen, therefore, that theoretically the high yield of forage crops should make them a sound proposition for raising farm production. Unfortunately, however, the matter is more complicated than appears at first sight. Three main factors detract from the profitability of forage cropping in Matamata County:

1. Regrassing the cropped paddock is costly and is in fact the greatest single cost of the cropping programme. In addition to the outlay for grass seed and cultivation there is the cost of extra manure on the young pasture, which in Matamata County, if a first-class pasture is to be obtained, must amount to almost a ton of superphosphate per acre over the first 18 months. When an old run-out pasture is cropped all the regrassing cost can be attributed to pasture maintenance, for in any case such a pasture must be ploughed and regrassed, and here the crop is "free". When a good pasture is ploughed for a crop, however, the cost of regrassing is part of the cost of growing the crop. More important, when a good pasture is ploughed it is possible that the new pasture established after the crop will be inferior to the original, and the lower production from the new pasture can more than counterbalance the value of the crop. There are few farms, however, with no pastures warranting renewal.

2. Farmers are generally unwilling to cash in on the extra feed provided by the crop by putting on extra stock to utilise it. There is consequently a tendency for pastures to grow rank and unproductive over summer or winter when the crop is being fed. This means that the crop merely substitutes for pasture, and there is no net gain in production.

3. Unwillingness to stock up certainly stems largely from the general unreliability of forage crops in Matamata County. Soil fertility generally is high enough to grow any crop, but weeds, pests, and diseases are such a hazard that crop failures and half successes are almost as common as successes.

White-fleshed turnips are the most popular of all forage crops.

However, with correct choice of the crop to be grown and proper weed and insect control most of these hazards can be overcome.

In the author's opinion the county's general need for pasture renewal warrants far more forage cropping than is at present being done. It is hoped to show how forage crops may be reliably produced, so that extra stock may safely be carried to cash in on the extra feed grown.

Requirements

Dairy farmers in the zone north of Putaruru require a crop that will keep cattle milking over January and February and part of March. Silage certainly helps maintain production over this period, but the amount of silage that can be conserved in November is insufficient to carry all the burden for the whole of the 2 to 3 months' drought period, unless stock numbers are sacrificed. A winter crop is not required.

A few years ago it was common for a paddock to be ploughed in November for a crop of swedes to be sown in December and fed in June and July, after which the paddock was sown to white-fleshed turnips or chou moellier for summer feeding. With regrassing in autumn two crops could conveniently be squeezed into an 18-month period.

This practice is relatively uncommon now for two main reasons: First, the winter crop is not now generally required, and secondly, the growing of a winter crop means that

MARATHON *Gumboots*

By SKELLERUP

Over 4,000,000 PAIRS of MARATHON GUMBOOTS Manufactured in New Zealand since 1943 have stood the Test of Time!

IF IT'S MADE BY SKELLERUP IT'S EQUIVALENT TO THE BEST THE WORLD CAN OFFER.

MARATHON
MADE IN NEW ZEALAND

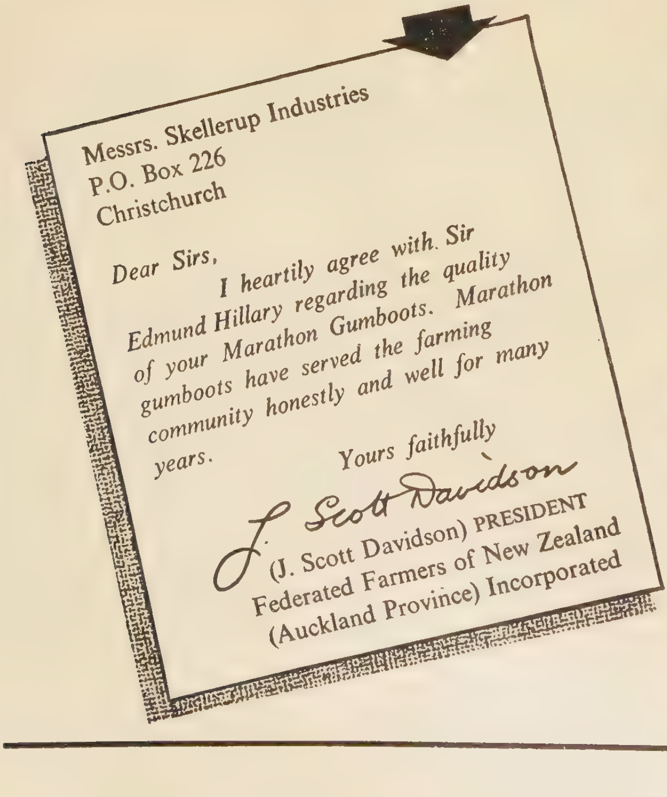
William H. Bremner

DESIGNED BY CANADIAN RUBBER FOOTWEAR EXPERT—William H. Bremner

(leading Canadian rubber footwear expert brought to New Zealand to pioneer the manufacture of a New Zealand-made gumboot to the highest Canadian standards). His unique experience has given New Zealand equivalent to the world's best.

Who says: "I am satisfied it's the most modern and best of its kind in the world—that is the only way to win satisfied customers—with top quality and that's the only way to keep them too".

ENDORSED BY MR. J. SCOTT DAVIDSON, PRESIDENT OF AUCKLAND FEDERATED FARMERS



Messrs. Skellerup Industries
P.O. Box 226
Christchurch

Dear Sirs,

I heartily agree with Sir Edmund Hillary regarding the quality of your Marathon Gumboots. Marathon gumboots have served the farming community honestly and well for many years.

Yours faithfully

J. Scott Davidson

(J. Scott Davidson) PRESIDENT
Federated Farmers of New Zealand
(Auckland Province) Incorporated

All Marathon Gumboots carry the Skellerup guarantee

The Preston Tyre & Fabric Company of Manchester, England, are proud to provide the linings for all Marathon Gumboots. The quality of the fabric makes a major contribution to the wear and service of the gumboots.

weeds such as redroot (*Amaranthus retroflexus*) and willow weed (*Polygonum persicaria*) grow and seed in the crop.

The growth of weed seedlings in the following spring makes the growing of a second crop difficult, and it should be remembered that it is the summer crop which is important. Indeed the two weeds named have become so troublesome that it is now difficult on many properties to grow even a first crop of turnips. The more pasture renewal that is done, and the higher the soil fertility is, the more troublesome do these weeds become. There are, indeed, pre-emergence weed control measures, which will be described later, but these measures are difficult and depend on obtaining the right weather at the time of sowing.

White-fleshed turnips are the crop most easily smothered by these weeds, and where these are troublesome a change could well be made to a crop better able to cope with competition. Chou moellier is the first obvious choice, but even this crop often succumbs to competition from vigorous weeds like redroot.

Maize, however, is very rarely defeated by weeds, and even if there is a chance of this, there are relatively foolproof post-emergence methods of weed control applicable to maize crops. Maize also does extremely well under the high fertility conditions where weeds are most troublesome. Further, since maize is a heavy yielder, smaller areas need to be grown, a condition which well suits the farm where a fair amount of pasture renewal has already been done. Yet a further advantage is that maize is sown at the end of October, a month later than turnips or chou moellier. This means that there is still plenty of time to sow maize after it has become obvious that a previously sown crop of turnips or chou moellier has failed.

For the sheep farmer in the north zone the requirements are more complicated. First and foremost, a crop is required on which ewes may safely be flushed and tail-end lambs fattened in a facial eczema outbreak. Secondly, a crop is helpful (though not essential) for wintering cattle and carrying hoggets safely through autumn. Unfortunately, the eczema period extends beyond the time when resowing of pasture is successfully done. At present most sheep farmers compromise by taking their chances with eczema and providing a winter crop only in occasional seasons. It is felt that a cropping rotation of as little as 3 per cent of the farm area would provide relative immunity from facial eczema for ewes and lambs, minimise hogget losses, and help winter cattle as well as provide for pasture renewal.

Eczema-safe feed must be a leafy crop able to smother out all traces of ryegrass, and lamb-fattening food must be palatable.

The weeds which make cropping difficult on dairy farms are not generally as troublesome on sheep farms. A suggested rotation actually now used by a few farmers is as follows:

A paddock is ploughed each September and sown to thousand-headed kale or chou moellier. This is used for flushing ewes during an outbreak of facial eczema, but if not required then, it can be kept for wintering cattle and hoggets.

If chou moellier is chosen, it can be used also to help fatten lambs, whereas thousand-headed kale, being relatively unpalatable, is not suited to this. Facial eczema, however, may make it necessary to feed the crop heavily to ewes in autumn, in which case there would be better winter recovery from thousand-headed kale, which is consequently thought the better crop.

The crop is cleaned up by cattle in June and July, and the paddock sown to a catch crop in September, which is fed before regrassing in March. The catch crop should provide the lamb-fattening food, and it may be chou moellier.

If the above routine were adopted, each paddock ploughed would be out of grass about 18 months and provide two crops—a winter and a summer one—sharing the cost of pasture renewal. Two paddocks would thus be under the plough each summer, one producing its first crop for autumn and winter feeding and the other its second for summer fattening feed.

In the south zone, it will be remembered, summers are relatively favourable, but winters are long. Dairy farmers here need a crop to help them through winter, and the growing of such a crop is indeed almost universal. Swedes and chou moellier are admirably suitable. The problem of weed competition with the growing crop is of little consequence here, where crops are in fact easily grown. Swedes in particular yield much more heavily than elsewhere in the county.

In this region of cooler and moister summers pastures can be sown in spring following the winter crop of swedes or chou moellier. Most farmers agree, however, that though spring sowings of pasture are reasonably successful, autumn sowings are usually a little better. They also believe that though a summer crop is not essential, it is still a help and is worth while for the slight extra expense. Turnips are the usual choice for the summer crop, with chou moellier a fairly close second.

As an alternative to the above rotation some farmers in autumn sow oats or ryecorn, which is grazed in winter and then allowed to recover for spring and summer use before ploughing and resowing pasture in autumn. The lower cost of such a system is offset by the lower yields.

The requirements of sheep farmers in the south zone are much the same as those of the north zone. Eczema-safe feed and winter feed are necessary. Requirements differ, however, in that the feed deficiency in winter is much greater. Most sheep farmers here winter cattle on swedes, but there is little attempt to provide crops for the period of facial eczema danger.

The rotation suggested for sheep farms in the north zone could advantageously be applied here. However, larger areas would need to be cropped than in the north because of the severe winters. Chou moellier could be used in preference to thousand-headed kale, for, as large areas are sown, autumn feeding would be light and recovery better.

Alternatively, the suggested rotation could be applied on a small scale, with the growing of a swede crop exclusively for winter use. In this region pastures can be resown quite successfully in spring if a summer catch crop is not desired.

Individual Crops

The crop species mentioned are the only ones which are extensively used in Matamata County. Some species which are a feature of other districts are seldom if ever seen here. Rape is never grown in the Matamata district, because it cannot be relied on to ripen under the humid conditions. Lupins are low yielding by local standards and very prone to fail because of stem rot diseases. Millet is grown to a very limited extent on dairy farms where a quick catch crop is required, but the yield is disappointing in an area where soil fertility will grow better crops. Carrots, mangels, fodder beet, and sugar beet are never grown as forage crops for cattle or sheep, though they are occasionally grown for wintering pigs. The labour required for growing these crops on a large scale is not available.

Green-feed Crops

Green-feed crops of oats and ryecorn have been mentioned briefly above. These crops are used to some extent at the south end of the district, in place of swedes, but their main use is for sowing in areas where resowing of pasture has been delayed beyond the end of April.

Turnips

White-fleshed turnips are the most favoured crop for all purposes. Apart from susceptibility to weed invasion, turnips are easily and cheaply grown and easily fed. Cows milk well on them and there is little waste when they are fed off. As well as being used for summer feed turnips are often established as late as the end of March

THOS. WADDELL & SONS
LIMITED
for PEARLITE
and STEEL

PLOUGH SHARES

We manufacture steel plough shares for all makes of ploughs including Hydraulic. Also cultivator points, chisel plough points and steel casting for every purpose.

Thos. WADDELL & Sons
LIMITED
Est. 1897—Steel and Iron Founders.
70 St. Asaph St. Phone 88-340,
Christchurch.

CUT TOPDRESSING COSTS
with the

MUNRO
TRIUMPH

MUNRO
"TRIUMPH"
TOPDRESSER

The cheapest and most efficient method of spreading fertiliser or lime, or sowing seed. At 10 m.p.h., an acre is covered in 3½ minutes. Quantity range, 1 cwt. to 2 tons per acre.

J. M. McCROSTIE
N.Z. Distributor,
P.O. Box 67, INVERCARGILL.
— AGENTS IN ALL CENTRES —

SEND FOR FREE BOOKLET

J. M. McCROSTIE
P.O. Box 67, INVERCARGILL.
Please send me Free Booklet on "Triumph" Topdresser.
Name ....
Address ....
....A

MOLACTRATE
PROTEINISED MOLASSES
BLOCK

MOLACTRATE

PROTEINISED MOLASSES

MOLACTRATE
PROTEINISED MOLASSES
BLOCK

BLOCK

THE STOCK FOOD
THAT FEEDS ITSELF

926

Mr Farmer!

"CLING"

STEEL NETTING STAKES

HAVE SO MANY ADVANTAGES

Quickly erected and dismantled.

Permanent — no deterioration.

Takes every size and type of netting.

Light and compact. No stapling required.

"CLING" Steel Netting Stakes, with their unique slot principle, are selling at the rate of 100,000 a year and are acclaimed by farmers everywhere as being the most effective way to erect netting fences, turnip breaks, docking yards, etc.
Available all Stock and Station Agents, Hardware Firms and Cyclone Stockists.
Manufactured by THE CYCLONE FENCE AND GATE CO. LTD., CHRISTCHURCH.
and distributed throughout New Zealand by CLARK & KING LTD., P.O. Box 814, Invercargill.

to provide winter feed. Yields of over 30 tons per acre have been recorded from turnip crops sown at the beginning of March.

They are a useful crop to establish where previously sown swede crops have failed, and the practice of sowing them in autumn is increasing. Indeed, some farmers who have had difficulty in getting swede crops established in December because of weed competition plough in January or February and sow turnips in March, when germination of redroot seed is not aggressive. The varieties Green Globe, Red Globe, and Purple Globe have all been extensively used in Matamata County, the normal practice being to sow a portion of each field in Green Globe and another portion in one of the other two varieties for early feeding. Recently, however, York Globe has increased in popularity, not only as a hardy, quick-growing, good-lasting autumn-sown turnip, but also for spring sowing. It seems probable that York Globe will eventually replace the other varieties in the county.

Chou Moellier

Where soil fertility is reasonably high chou moellier is a heavier-yielding crop than turnips, and it competes with troublesome weeds a little better than turnips. However, the cost of chou moellier seed, the difficulty of feeding the crop off, and the waste of large proportions of it in feeding make it less popular than turnips for summer feed. As a winter crop chou moellier is a close second to swedes. In Matamata County, however, chou moellier must be grazed before the beginning of August, as experience has shown that grazing during this month is liable to precipitate an outbreak of red-water disease in the stock. Giant chou moellier is usually chosen for cattle and the medium-stemmed variety for sheep.

Thousand-headed Kale

Thousand-headed kale is not a popular crop partly because its yield is poorer than that of chou moellier and partly because it is unpalatable. Where winter recovery of an autumn-grazed crop is desired, however, thousand-headed kale is superior to chou moellier. The latter appears also to be more susceptible to soft-rot disease after damage during autumn grazing.

Maize

The practice of growing maize for summer dairy cattle food is growing year by year, and the suitability of maize for this purpose has already been referred to. There appears to be little to choose between the various maize varieties.

Swedes

The swede varieties Superlative, Grand Master, and Crimson King considerably outyield all other varieties in Matamata County. As Superlative, the quickest-maturing variety, appears to go off quicker than the other two, its use is decreasing.

Seedbed Preparation and Sowing of Seed

The plough, discs, and harrows are the main implements of seedbed preparation, though some farmers use rotary hoes or giant discs. It is unusual for pasture to be broken up for a summer crop before the middle of September, because pasture growth rate does not usually catch up to the requirements of the dairy herd until this date and few farmers are willing to sacrifice a paddock until feed becomes plentiful.

As turnip or chou moellier crops need to be sown before mid October for best results, there is little time for seedbed preparation for these crops. For winter crops of chou moellier, normally sown in November, or for maize crops sown late in October or early in November the position is not so acute. Swede crops, however, are sown at the end of December, and since many of these are sown on paddocks from which silage has been harvested in late November, there is again little time for weathering of the seedbed.

There are few drills in the district, and it is consequently more usual for the seed to be broadcast mixed with the manure through the topdresser.

Brassica seed is usually covered by brush harrows and maize seed is usually disced in. Rollers are also very scarce, and broadcasting seed on a rolled surface is uncommon. The manure sown with the seed of brassica crops usually consists of 3 to 4 cwt. per acre of serpentine superphosphate. Potassic or nitrogenous fertilisers are seldom used on crops, and indeed limited experimental work in the Matamata district on the use of these manures on brassica crops appears to indicate that they are not warranted except perhaps when exceedingly poor pastures are ploughed to grow the crop. Maize crops are usually sown with 3 to 4 cwt. of superphosphate and some blood and bone manure, usually 1 to 2 cwt.

Maize is sown at 100 to 120 lb. of seed per acre, and turnips and swedes at 14 to 16 oz.

Most chou moellier and thousand-headed kale crops are sown at 2 lb. of seed per acre, but for some chou moellier crops up to 5 lb. of seed is sown to produce a leafy feed for dairy cattle.

Giant chou moellier is a heavy yielder. Chou moellier competes with weeds better than turnips, though even this crop is sometimes smothered by redroot.

A Johnson's Fence means

SECURITY FOR VALUABLE STOCK

Johnson's English Wire, drawn with the skill of 150 years' experience, is protected by patented Hot Dip Galvanising. This ensures long life in New Zealand's climatic conditions and it is particularly resistant to the corrosive action of salt-laden air.

Remember when fencing new Paddocks or replacing old fences, ask for and buy the best. . . .

JOHNSON'S ENGLISH FENCING WIRE

MANUFACTURED BY: RICHARD JOHNSON & NEPHEW LTD. MANCHESTER, ENGLAND.

OBTAINABLE FROM STOCK & STATION AGENTS & HARDWARE MERCHANTS EVERYWHERE

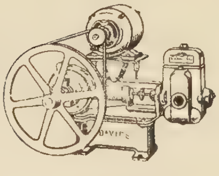
SOLE NEW ZEALAND AGENTS:

JOSEPH NATHAN & COMPANY (N.Z.) LTD.

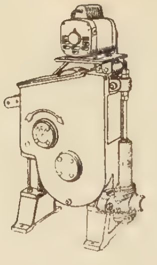
WELLINGTON (Head Office) AUCKLAND CHRISTCHURCH P.O. Box 395, DUNEDIN

SP.563A

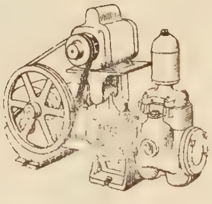
DAVIES PUMP RANGE



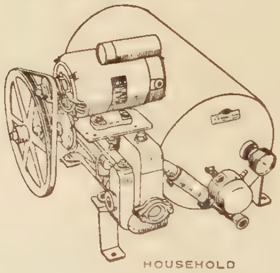
[illegible]00 SURFACE WATER PUMP



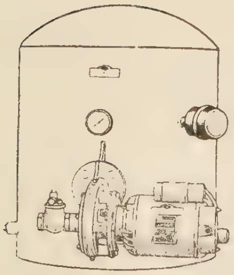
DEEPWELL GEARING



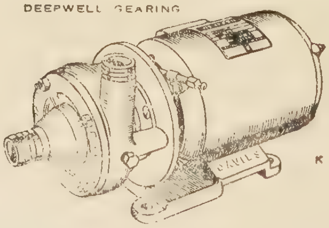
500 SURFACE WATER PUMP



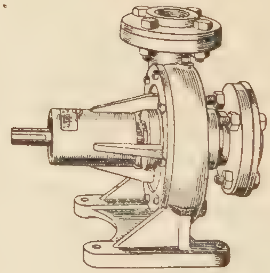
HOUSEHOLD AUTOMATIC SYSTEM



HOUSEHOLD AUTOMATIC SYSTEM



K 1/6 CENTRIFUGAL



MODEL M

1½" — 2" — 3" — 4" CENTRIFUGAL

The above illustrations show some of the wide range of pumps manufactured by D. H. Davies Ltd., and these range from deepwell gearings through household and shed units to any type required for a particular job. DEPENDABILITY — EFFICIENCY and LOW UPKEEP, with prices the lowest on the market. All pumps are manufactured in Davies' modern pump works at Penrose.

Manufacturers:

D. H. DAVIES & Co. Ltd.

BOX 29, PENROSE. Phones: 594-531 & 596-337

Agents throughout New Zealand

Utilisation

The method adopted for the feeding of the crop to stock varies somewhat with circumstances. Generally, utilisation is good on dairy farms but rather poor on sheep farms.

For dairy cows the electric fence is usually used to feed the crop. With turnips usually one break is fed daily, but in some cases two breaks are fed daily, namely, after milking night and morning. With this crop it is necessary only to erect the fence, but when maize or chou moellier is fed it is necessary to cut a swath through the crop with the mower each time the fence is re-erected. A new break is then allowed only every second or third day. Sometimes, however, the mower is used each day to cut the day's ration of crop. The electric fence is then erected on the edge of the mown area to prevent stock wandering into the standing crop.

This method greatly reduces the waste which occurs when a standing crop is fed. Care must be taken to erect the fence so that the cows are unable to reach over it and short circuit it by pulling standing stalks on to the wire. Some farmers use finger-wheel side-delivery rakes to move heavy chou moellier or maize crops clear of the standing plants.

Few farmers now harvest a crop by hand for feeding to stock. A measurement was made near Matamata of the amount of waste occurring when a crop of turnips was fed to dairy cows by daily breaks with the electric fence. The loss of about 12 per cent of the crop by weight left by the animals is not very great. There was very little leaf left, most of the waste consisting of small bulbs or deeply embedded ones. Small bulbs constituted 40 per cent of the waste, and probably these would not be pulled if the crop were hand fed. Waste could be reduced if the field were disced after grazing to lift embedded bulbs, which would then be readily eaten. Therefore the labour required for hand feeding of turnip crops, and of maize and chou moellier crops fed out under dry conditions, appears to be unwarranted, as these may be efficiently fed by the mowing and electric fence method.

Winter crops of swedes or chou moellier are more normally fed on dairy farms by using the electric fence for breaks designed to last about 3 days when the herd is allowed access to the crop for a specified period each day.

On sheep farms usually the crops are divided into two or, at the most, three breaks by temporary wire-netting fences. Under these conditions there is much waste of the feed from trampling of leaves into the soil. It is also not uncommon for a crop lightly grazed by this method to go off very quickly owing to soft-rot disease, which quickly attacks damaged tissue in a mild wet season. More attention to methods of utilisation would enable sheep farmers to grow a smaller area of crop with the same results as from a large area badly utilised.

Maize yields very heavy crops and is the most reliable of the commonly grown forage crops in Matamata County. It is seldom affected by weed competition.

Weeds Controlled in Forage Crops

SINCE this article was prepared, the sodium salt of monochloroacetate ("Monoxone" and "Stantox MCA") has been used effectively to control some weeds in chou moellier and swedes and should now be used in preference to TCA. "Monoxone" and "Stantox MCA" at up to 15 lb per acre, preferably when the weeds are small and the crop has three or more leaves, control such weeds as redroot, wireweed, redshank, and black nightshade. They also control young spurrey. The chief disadvantage is that the salt does not control fathen and is too damaging for use in turnip crops.

Weed Control

The only two weed species which are sufficiently aggressive to cause complete crop failure in the county are redroot and willow weed. These two weeds have caused many farmers to forsake forage cropping, and others have modified their cropping technique.

Certain methods may be used to combat weed invasion:

1. Dairy farmers in the more fertile northern end of the county, where the weeds are more serious, have the best weapon for combating these weeds in the growing of maize. The competition of this crop with the weeds has already been referred to.

2. On many farms weed competition can be reduced to insignificant proportions by avoiding the growing of two consecutive crops on the one paddock. The first crop is usually relatively weed free, except on some of the higher fertility farms.

3. Early sowings of brassica forage crops have been helped by allowing the crop to cover the ground before large-scale germination of weed seedlings has begun. In the northern parts of Matamata County redroot seed does not germinate in large quantities before October in an average season. Turnip and chou moellier crops established in the last week of September appear to have a better chance of success.

TARTAN

topics

BULLETIN SERVICE

To obtain any of the bulletins listed, merely tick the ones required, fill in your name and address, cut out and post to us or ask at your nearest TARTAN Stockist.

E. 1	Howry-Berg Sheep Duster Reminder on operating checks.
G. 1	Dosage variations for TARTAN Concentrates applied with different sheep spray races.
G. 2	Sheep dips and concentrates—selection chart.
G. 3	Bath dipping table—Amounts required.
G. 4	Spray dipping table—Amounts required.
G. 5	Positioning the Howry-Berg Duster in sheep yards.
P. 1	Aldrin Bath Dip.
P. 2	Aldrin Spray Dip.
P. 3	Dieldrin Bath Dip.
P. 4	Dieldrin Spray Dip.
P. 5	L-K Bath Dip.
P. 6	L-K Spray Dip.
P. 7	Dieldrin Sheep Dust.
P. 8	Procall Dust—Use on Livestock.
P. 9	Procall Dust—Use on Crops.
P. 10	Dieldrin Sheep Spray Concentrate.
P. 11	Aldrin Sheep Spray Concentrate.
P. 12	Dieldrin Blowfly Solution.
P. 13	Fenodren—Liquid Phenothiazine.
P. 15	D.D.T. Prills.
P. 16	Aldrin Prills.
P. 17	Cobalt Prills.
P. 18	Molybdenum Prills.
W. 3	Clover damage by Hormone Weedkillers.
W. 4	Weed control in Cereal Crops.
W. 5	Control of Gorse.
W. 6	Control of Blackberry.
W. 7	Control of Sweet Briar.
W. 8	Control of Ragwort.
W. 9	Control of Californian Thistle.
W. 10	Control of Variegated Scotch, Nodding and Winged Thistles.
W. 11	Control of Spurrey (Yarr).
W. 12	Control of Rushes.
W. 13	Control of Barley Grass.
W. 14	Control of Fathen.
W. 15	Control of Buttercups.
W. 16	Control of Docks.

POST THIS COUPON OR CONTACT YOUR LOCAL DISTRIBUTOR.

North Island: Summit Products Ltd.
South Island: A. S. Paterson & Co. Ltd. and South Island Chemicals Ltd.

FARM CHEMICALS CO.
PORT MAPUA NELSON

Please send me Bulletins as ticked above.

Name: ....

Address: ....

.... FC.10

For ALL farm stock
AVAILABLE IN 3 STRENGTHS

'100'	'500'	'1,500'
100,000 units penicillin per tube	500,000 units penicillin per tube	1,500,000 units penicillin per tube

VETSPEN HYPODERMIC
PENICILLIN INJECTION

GLAXO LABORATORIES (N.Z.) LTD., GLAXO PALMERSTON NORTH
VH11.8

FLOREAT · IMPERII · PORTVS

Ship via London

The
PORT OF LONDON
AUTHORITY

A Self-governing Public Trust for Public Service

Britain's Premier Port.
Equipped for all types of ships
and cargoes.

For full particulars apply to:
Mr. W. C. Perkins,
42, Bridge Street,
Sydney.

In areas of high fertility redroot may smother crops of turnips or swedes, but the illustration shows that redroot and redshank (left) can be controlled in these crops (right) by pre-emergence application of 15 lb. per acre of TCA under suitable moisture conditions.

4. It has already been stated that generally insufficient time is given to seedbed preparation. When crops are to be sown after the first week in October in the north zone the seedbed should receive at least three light chain harrowings at 5- to 7-day intervals to destroy surface-germinating weed seeds. Heavy harrows, which bring fresh seed to the surface, should not be used.

5. Redroot and willow weed seedlings can be destroyed when TCA at 15 lb. per acre is applied to the soil as the last operation immediately after the crop is sown. This treatment is extremely effective when the soil is wet or when light showers follow application within about 3 days. Under dry conditions the treatment is useless. Under the correct weather conditions many Matamata farmers have used the treatment successfully, and anyone who is prepared to wait for suitable weather before sowing his crop could apply this treatment with reasonable expectation of success.

6. Seedlings of redroot and willow weed in maize crops can be destroyed with 2,4-DB hormones at 1 to 2 lb. acid equivalent per acre. After sowing and up to about the 6 in. stage of growth maize may safely be harrowed to control seedling weeds. This should be done during the hot period of the day, when the maize plants are not turgid with water.

From the foregoing it can be seen that weeds pose a problem on many farms where forage crops are desired, but the problem can be, and in many cases known to the author has been, solved.

Pests and Diseases

Forage crops are liable to be attacked by a variety of pests and diseases not all of which warrant control measures. One of the worst pests is the springtail, and many brassica crops have been destroyed while in the seed leaf stage by this insect. Where a crop has been lost to this pest resowing is more likely to be successful if ½ lb. of lindane per acre is sown with the seed.

The springtail is a tiny insect smaller than a pinhead and difficult to see. If there are no springtails, but crops are lost in the same growth stage, especially in early November, the grass-grub beetle may be responsible. This is one more reason for early sowing of crops so that they are past the seed leaf stage by November.

Another pest which does its worst damage in the drier seasons, when crops are more vital, is the cabbage aphid. This insect sucks the sap of members of the cabbage family, including turnips, swedes, chou moellier, and kale. Under humid conditions the insects multiply rapidly and can destroy crops within days if the soil is dry. Aphids can be checked by ½ lb. of lindane per acre, but high pressures and fine jets must be used to contact the insects, which accumulate almost entirely on the undersides of leaves. Other insecticides also show promise in aphid control and further development in such control can be expected. In Australian literature malathion at 2 fl. oz. of 50 per cent emulsion per acre is recommended in preference to lindane.

If swedes are being grown, the aphid-resistant varieties Calder and Sensation may be tried.

White butterfly, diamond-backed moth, shield bug, and a species of cut worm are also commonly found on brassica crops in the county, but crop damage is seldom severe.

On maize crops cut worm and army worm caterpillars can cause severe damage. Several cases have been noted where 7 ft.-high maize crops have been completely defoliated by these pests in less than a week. If the caterpillars are noticed among seedlings of maize, the area may be treated with 1 lb. of 100 per cent DDT per acre. Usually, however, it is in the semi-mature crop that the caterpillars are first seen, generally about the end of January. The spreading of baits by hand is then the only feasible method of control. Baits have been used with spectacular success in mature maize crops in the Matamata district. The baits used are 30 lb. of bran and ½ lb. of 10 per cent DDT per acre, or 30 lb. of sawdust, 5 lb. of molasses, and ½ lb. of DDT.

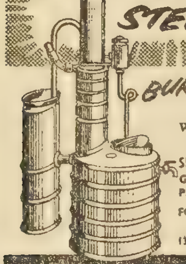
All the major soils in Matamata County are liable to produce mottled heart disease of swedes because of the marginal state of soil boron supplies. Turnips are less likely than swedes to suffer, but chou moellier sometimes produces internally cracked and discoloured stems owing to the same cause. Though not universally practised, the application of 8 lb. of commercial borax per acre a few days before seed is sown is usually warranted.

In mild autumns and winters soft-rot diseases, locally known as collar rot, stem rot, etc., sometimes cause heavy losses in swedes and in chou moellier crops which have been lightly fed off in autumn for winter recovery. Aphid and shield bug damage of chou moellier also appears to predispose the crop to soft-rot diseases. No fully effective preventives or cures are known for these diseases, but they can be reduced by sowing later-maturing crop varieties.

Club root disease is common in most parts of the county, but seldom produces crop failures. Where it does a club root-resistant crop such as chou moellier should be grown.

Other pests and diseases are common, but since they are not usually of great economic importance, discussion of them is not warranted here. There are, however, answers to almost all the pest and disease problems and all other growing problems of forage crops, and the application of these solutions will make the growing of forage crops fairly reliable in Matamata County.

SPEEDWAY
STERILISER



BURNS OIL OR WOOD

Write for FREE
Illustrated Catalogue

SPEEDWAY PRODUCTS LTD.
GT. SOUTH ROAD, PENROSE
P.O. BOX 24 *and at*
FORD BUILDINGS, COURTENAY PLACE
WELLINGTON
139 WORCESTER ST CHRISTCHURCH

STEAM & BOILING WATER

To MANSION HOUSE, KAWAU ISLAND.
(N.Z.'s leading Seaside Holiday Resort)

Please forward details of the Big Holiday Concession Rates you are offering for advance bookings for after Easter until Xmas.

Name ....
Address ....
....

K-16
FOR
RUSTY
ROOFS
AND
TANKS

AND ANYTHING ELSE THAT'S RUSTY OR LIKELY TO GO RUSTY!

This revolutionary paint "loves" rusty surfaces, such as rusty roofs and rusty iron and steelwork of all kinds, and gives the appearance of new galvanising.

K-16 ANTI-CORROSIVE PAINT IS AVAILABLE FROM PAINT, HARDWARE AND STOCK FIRMS IN PINTS, QUARTS, GALLONS AND 4-GALLON TINS.

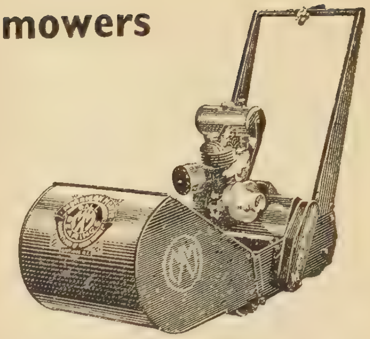
BULLETINS

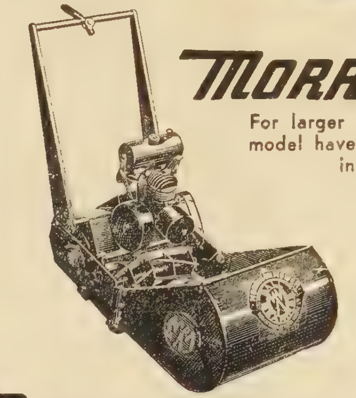
A comprehensive display of Departmental bulletins may be seen at your local office. When in town, call and inspect them. You may see a bulletin that will solve that farming problem.

Most Popular motor mowers in all New Zealand!

MORRISON 16"

A low deposit puts this famous mower on your lawn this weekend!





MORRISON 20"

For larger lawns. This and the 16" model have outsold all other makes in New Zealand.

Save your back and your time this weekend with

MORRISON
MOTOR MOWERS

NEW! SENSATIONAL!

NUFFIELD
UNIVERSAL
THREE

The small tractor with BIG TRACTOR PERFORMANCE!

★ PROVED in all conditions for thousands of hours in England.
★ PROVED in New Zealand farm trials! More traction! More work per gallon! More time-saving reliability! More sources of implement power!

See this brilliant new Nuffield Universal Three at your Nuffield Dealers Now.

EARLY DELIVERY! 12 MONTHS' WARRANTY

THE DOMINION MOTORS LTD.

HEAD OFFICE: COURTENAY PLACE, WELLINGTON.
and at AUCKLAND, CHRISTCHURCH and TIMARU.
Representing: NUFFIELD EXPORTS LTD. (Chairman: Sir Leonard Lord).

Pedigree Pig Improvement:
Review of Progress up to 1958

THE last review of the data recorded under the Pedigree Pig Improvement Scheme launched in June 1956 by the New Zealand Pig Breeders' Association and the New Zealand Pig Producers' Council was published in the "Journal" in February 1958. This review by A. Longwill, Superintendent, Pig Industry, Department of Agriculture, Wellington, brings the information recorded under the scheme up to date as at 31 December 1958. The review covers 212 litters recorded up to the end of the period and for which carcass appraisal had been completed.

THE main justifications for any on-farm pig recording scheme are:

(a) The breeder is encouraged to take a keener interest in the selection of his stock for commercial qualities and in the provision of conditions which will enable them to express their full capacity in this direction.

(b) Records can provide information which, if properly interpreted, will give a better guide than has existed to selection of individual animals with higher-than-average breeding merit. By providing a more precise measure of performance of any animal and of its merit for breeding, through the performance of its litter brothers and sisters or of its progeny, recording may, if the data are comprehensive, be a basis for the development of better pedigree pigs generally.

(c) Though performances are not comparable as between farms, and where progeny are recorded on only one or a limited number of farms the precise value of the inherited component of the performance cannot be determined, some degree of selection on commercial merit can be achieved by setting a sufficiently high standard for each of the important commercial criteria.

Standards Employed

This scheme aims at publishing the details of performance of pedigree litters which have achieved the minimum standards and using these to assist the individual breeder on his within-herd breeding policy and, within limits, to guide the prospective purchaser of breeding stock. Results are now published for three performance classes, A, B, and C (table 1).

Results for litters which do not reach the required standard are not published, but a full statement is supplied to the breeder. This should help him to determine what is his chief problem. This may lie not so much in the lack of inherent capacity in his stock as in the management and conditions provided for them, which may have resulted in sub-standard litter performance or growth-rate. Thus informed the breeder has the incentive to provide an environment which will enable his pigs to express their full capacity for efficient production. Only under such conditions can selection be made for such economically important characters as growth-rate. Only when this has reached a reasonable standard do differences in carcass qualities mean very much. This is the logical order of priorities in improvement when, as at present, there is no commercial expression of preference for a high-quality carcass.

Because a boar sires a relatively high number of progeny, it is very important in pig improvement to recognise the sire with capacity to pass on to his progeny with reasonable consistency genes responsible for the development of characteristics of economic importance. For this reason the performances of litters are grouped under their respective sires.

When three class A litters from different sows, no two of which are closer related than half-sisters, are recorded the boar is regarded as a "Merit Sire", provided at least 50 per cent of the recorded litters sired by the boar reach the required standard. A clearer picture of his true breeding worth will become apparent as more of his litters, from as wide a variety of sows as possible, preferably under different management conditions, become available.

TABLE 1—QUALIFYING STANDARDS FOR LITTER PERFORMANCE, GROWTH-RATE, AND CARCASS QUALITY

Class	Minimum standards of performance					
	Number in and weight of litters at 3 weeks				Points for growth-rate	Points for quality carcass
	Maiden litters		Second and subsequent		(maximum) 25)	(maximum 100)
	No.	Liveweight	No.	Liveweight		
		lb		lb		
A	7	75	8	95	87½ (70 per cent of possible)	
B	7	75	8	95	10	70
C	6	65	7	80	10	70

TABLE 2—ANALYSIS OF PERFORMANCE OF 153 LITTERS WEIGHED (FROM 212 NOMINATIONS)

Litters Weighed but not Carcass Tested

		Basis of disqualification	
Failed to reach litter-performance standard	31	(a) Number alive at 3 weeks	7
		(b) Litter weight at 3 weeks	15
		(c) Both (a) and (b)	9
Not proceeded with	28	(a) Kept or sold for breeding	9
		(b) Setback (disease or feed shortage) ..	4
		(c) Abandoned (labour shortage)	5
		(d) Abandoned (below class A)	3
		(e) No reason given	7

Litters Completing Test

Failed to qualify	52	(a) Growth-rate	23
		(b) Carcass quality	8
		(c) Both (a) and (b)	15
		(d) One pig only killed	6
Qualified	42	Class A	38
		Class B	1
		Class C	3

TABLE 3—LITTER RECORDING RESULTS: BREED SUMMARY

Breed	Maiden litters				Second and subsequent litters			
	No. of litters	Av. No. of pigs		Total litter weight (21 days)	No. of litters	Av. No. of pigs		Total litter weight (21 days)
		Born	Alive	lb.		Born	Alive	lb
Large white ..	18	10.5	8.7	95	95	12.8	9.8	113
Berkshire ..	7	10.1	9.3	91	14	10.1	8.8	107
Tamworth ..	2	10.5	8.5	80	12	9.4	7.7	98
Large black ..	1	9	7	75	1	11	9	139
Wessex	—	—	—	—	3	11.3	10.6	121
All breeds ..	28	10.3	8.8	93	125	11.9	9.5	111

Snowwhite and beautiful !

Key FENCE and GATE WHITE PAINT

ONLY 42/- PER GALLON!

PROTECT YOUR PROPERTY NOW

with this special KEY paint

- ★ Non poisonous
- ★ Safe for Stock
- ★ Easily applied
- ★ Wonderful coverage

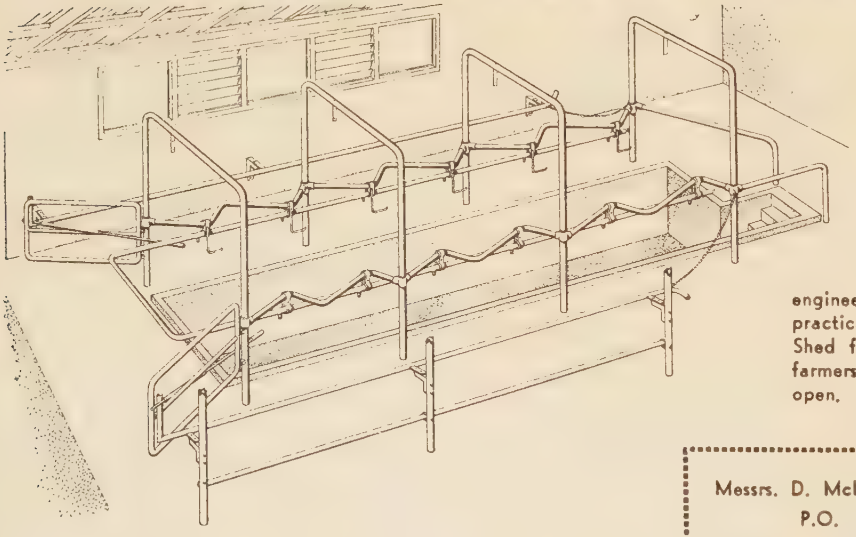
MANUFACTURED BY

PREMIER PRODUCTS LIMITED

66 DIXON STREET, WELLINGTON.

AVAILABLE FROM STOCK FIRMS THROUGHOUT NEW ZEALAND

ANGLE-PARK Your Cows!



Easily erected without special tools or welding. Independent of roof structure. Galvanized Pipe. Maximum unobstructed space around udder. Running water available at each cow. Cup hangers. Adequate guard rails. Adjustable head-stall rail.

Research shows that this type of bail is the most efficient. One man can handle up to 100 cows. Wallace engineers have produced a unit that is completely practical, easily erected and extremely sanitary. Shed front columns are optional extras for those farmers who wish to leave one side of the shed open.

D. McL. WALLACE LTD.

P.O. BOX 9010, NEWMARKET, AUCKLAND.

— BRANCHES AND AGENTS THROUGHOUT N.Z. —

Messrs. D. McL. WALLACE LTD.,
P.O. Box 9010, Newmarket, Auckland.

Please send me without obligation full details of Wallace Herringbone Pipe Bails.

Name ....

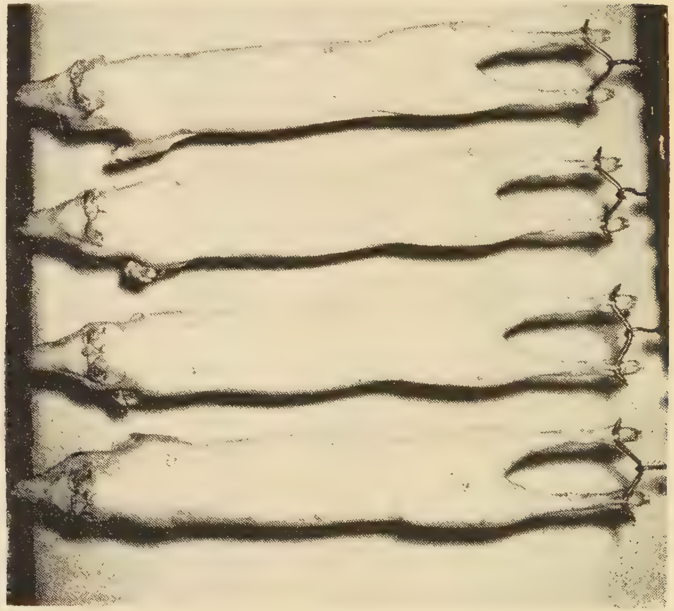
Address ....

....

TABLE 4—PEDIGREE PIG IMPROVEMENT SCHEME: QUALIFIED LITTERS
(Maximum points in brackets: L., loin development; B., belly thickness; M., marketing points)

Owner	Breeding of litter		Date born	Litter weight at 3 weeks	Dead-weight	Carcass test results (average) points										Total points
	Sire	Dam				Growth-rate	Length	Back fat Sh.	Back fat Loin	Bal.	Ham	Sh.	L.	B.	M.	
PORKERS																
Class A				lb	lb	(25)	(20)	(10)	(15)	(5)	(15)	(10)	(10)	(5)	(10)	(125)
C. I. Wright, Kaitaia	L.W. 12432	L.W. 14336	6/7/58	146	84	13	17½	9½+	11½+	4	12	8	7	5	10	97½
H. and N. Myers, Mauriceville ..	L.W. 14990	L.W. 14185	27/6/58	111	81	16½	16½	8+	15	4½	10	5	7	4	8	94
C. P. Clout, Eketahuna	L.W. 12824	L.W. 13074	7/6/58	155	75	13	17	7—	13—	5	9	7	7½	4	9½	92
C. E. Allen (Mrs), Whangarei ..	L.W. 14663	L.W. 14159	30/6/58	159	87	25	7½	10	11—	1	11½	5	6	5	8½	90½
C. P. Clout, Eketahuna	L.W. 14812	L.W. 15344	7/7/58	127	83	9	19	8½—	13—	5	10	5½	6	4½	9	89½
Class C																
R. V. McGregor, Gisborne ..	B. 30857	B. 31408	15/8/58	85	71	22	16½	6½+	15	5	10	5½	7½	5	4½	97½
BACONERS																
Class A									(20)						(5)	
G. E. Heppenstall, Otorohanga ..	L.W. 13947	L.W. 14387	1/6/58	146	130	20	18	9+	18—	5	11	7	6½	4	5	103½
G. E. Heppenstall, Otorohanga ..	L.W. 13947	L.W. 13737	12/5/58	125	125	22½	17	8½+	17+	5	11½	5½	6½	4½	5	103
G. E. Heppenstall, Otorohanga ..	L.W. 13947	L.W. 14388	1/6/58	117	133	21	15	6+	18—	5	12	7	6	2	5	97
N.Z. Pig Producers' Council, Te Awamutu	L.W. 13631	L.W. 13145	9/7/57	135	145	16½	13	9½+	17+	2	9½	8	7	5	3½	91
J. W. Risi and Son, Ngaruawahia	T. 18871	T. 18738	24/9/57	137	137	10½	16½	6½+	17+	4½	11½	7	8	3½	4	89

+ Points lost because too much fat. — Points lost because too little fat



[*Sparrow*

Carcass appraisal is based on between two and four average pigs from the litter.

It may well be that a boar rated Merit Sire on the basis of a few litters in a very well managed herd may be less deserving of the title than another whose litters are recorded under less favourable circumstances. However, until more recording has been done and our rough methods for selecting animals with the desired genetic make-up are developed into something more precise they provide the best available guide to breeding worth.

The only two boars which have qualified under the present Merit Sire requirements as outlined are:

National Dirk (13631), seven qualified class A litters out of a total of 12 litters recorded at the National Breeding Centre, Korakonui.

Dominion Bonza (12824), three qualified class A litters, two recorded in Mr E. W. Harrison's stud, Palmerston North, and one in Mr C. P. Clout's stud, Eketahuna. Only three litters by this boar have been recorded under the scheme.

Analysis of Litter-recording Data

Of the 212 nominations received for which all stages of the recording have been completed during the period under review 58 were withdrawn and one litter was aborted. Fifteen additional to those reported on in the previous review were withdrawn because insufficient pigs were born for them to reach the threshold litter-performance standard.

Of the 153 litters weighed at three weeks 122 reached the required three weeks' standard, but 28 were not proceeded with to the carcass-test stage. Among the reasons for this the commonest were slow growth-rate, pigs required for breeding, and knowledge that the litter would not qualify better than class C. An analysis of the performance of the 153 litters is set out in Table 2.

Details of litter performance as at 21 days according to breed and sequence number of litter are summarised in Table 3.

Table 4 sets out all the essential performance data for the litters which have qualified subsequent to those published in February 1958.

Mobilgas
Mobiloil
Mobildiesel

"... *first in the field,*

and still the

finest ..."

FOR OVER 63 YEARS STANDARD - VACUUM OIL CO. HAS PROVIDED THE N.Z. FARMING INDUSTRY WITH THE FINEST IN FUELS AND LUBRICANTS.

IT'S A **World-Beater**

at a price that defies competition

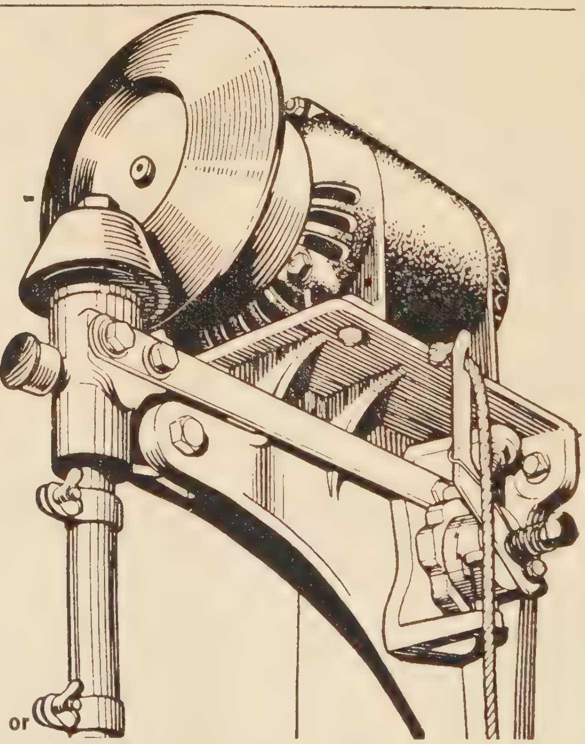
THE NEW MODEL

KIWI
Electric
SHEARING MACHINE

★ STREAMLINED WALL BRACKET simplifies adjustments and maintenance.

★ IMPROVED FRICTION DRIVE guarantees smoother operation and position speed.

Half horsepower motor ensures ample power. Ball bearings throughout ensure longer life. The new model Kiwi includes all the well known features that have made Kiwi Shearing Machines leaders in their field for twenty-five years.



Enquire now from your KIWI Agent or

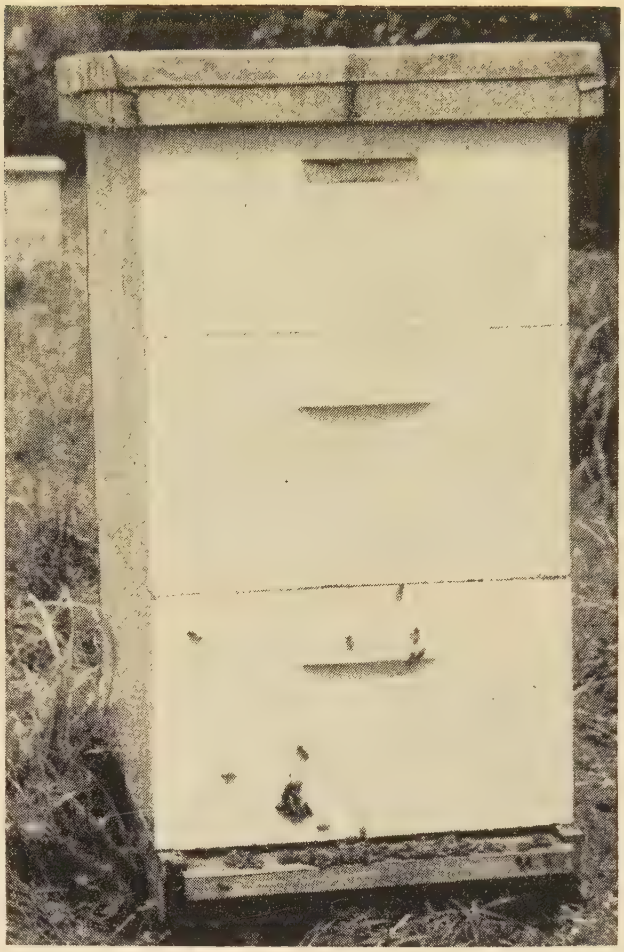
NEW KIWI SHEARING MACHINE CO. LTD.,
90 Federal St., Auckland.

Winter Work for the Domestic Beekeeper

By D. A. BRISCOE,
Apiary Instructor, Department of Agriculture,
Tauranga

ONCE all outside work in the apiary is finished the domestic beekeeper should repair and renovate equipment in preparation for the next honey season. To ensure long service from supers they should be well painted and properly stored to protect them from wind and rain. Equipment left lying round the apiary not only looks untidy but deteriorates very rapidly. With the increasing use of exotic timbers for beekeeping woodware beekeepers should be aware of the need to use a suitable timber preservative, and for this they are advised to use only good lead and oil paint.

QUITE often domestic beekeepers use creosote or other similar tar derivatives to preserve supers and hive parts. This practice is not recommended because fumes from creosote during hot weather can be absorbed by the honey within the hives. When this occurs the honey becomes tainted and objectionable for human consumption. Fumes from creosote can also distress the bees and in some instances will drive them from the hive.



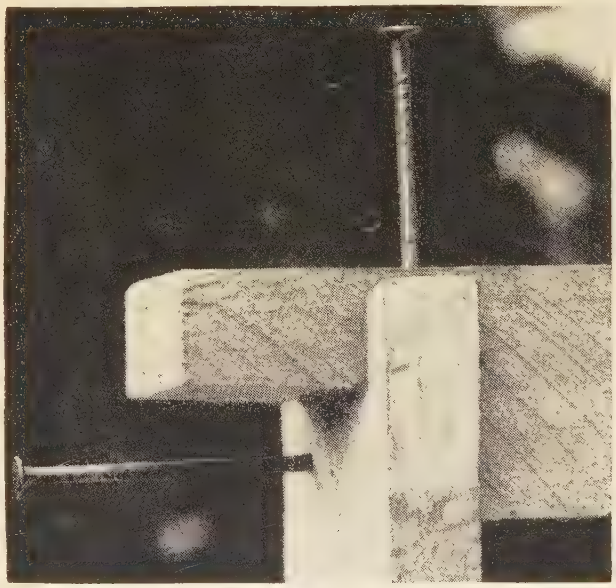
[*Rendells*

A well constructed, tight-fitting hive of standard specifications.

Checking of Bee Combs

All bee combs should be checked, and damaged ones or combs containing a lot of drone cells should be rendered down and the beeswax salvaged. This is done by breaking the combs into fairly small pieces and dropping them into a tin or bucket of water kept simmering over a small fire or stove. Care should be taken that the material does not boil too vigorously, as it tends to boil over very easily. This material should be kept well agitated while it is boiling. After being allowed to boil for some time it can be left to cool, or if desired, the wax can be poured into a small mould while it is still hot.

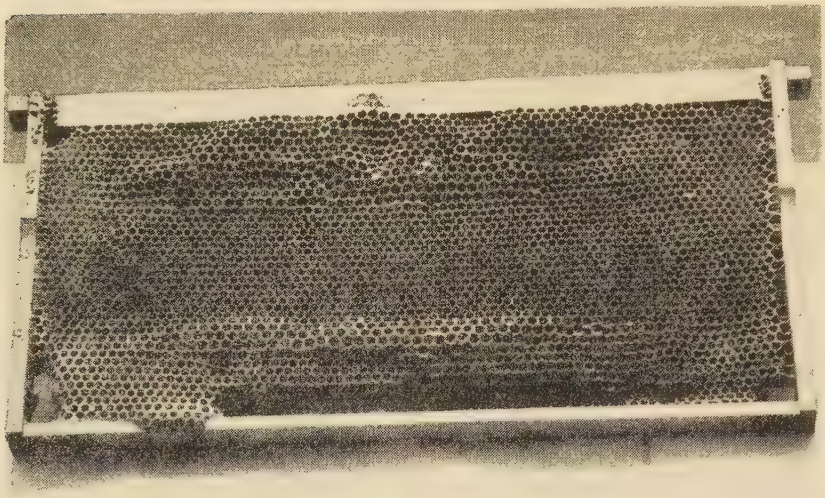
▼ Correct method of check nailing a frame.



[*Rendells*

Examination of Extracting Equipment

It is also advisable during winter to examine all extracting equipment. Honey extractors can deteriorate very quickly if they are not thoroughly cleaned and dried after use. Once rust starts, especially in the baskets of the machine, it is difficult to arrest and this sometimes can prove very costly. Honey tanks should be cleaned, dried, and then left turned upside down while not in use to prevent them accumulating dust and dampness. The honey knife and strainers should also be examined and put away carefully.



[Green and Hahn

Faulty wiring and sagging of the foundations induce the bees to build much undesirable drone comb. Such combs should be culled and rendered down for beeswax.

Increasing Hives

If an increase in the number of hives is contemplated for the coming year, now is the time to prepare additional equipment. Every endeavour should be made to have four supers complete with frames and foundation for each hive.

This material is usually bought in the "flat" or unassembled. Though the assembling of such material is straightforward enough, care should be taken to ensure that the supers fit neatly and squarely when placed together. The frames should be check nailed with one nail through the top bar and into the end bar and the second nail through the end bar and into the end of the top bar (see illustration on page 363). This is a very satisfactory way of nailing a frame and ensures a joint that will not readily pull apart.

At this stage the frames could be wired, but it would be advisable to leave fitting of the comb foundation and embedding of the wire until the weather becomes warmer and the wax becomes more pliable. Loss of foundation through breakages is then kept to a minimum.

Building Standard Equipment

Though good standard hive equipment is available from different firms, some beekeepers prefer to make their own hive parts.

It cannot be too strongly stressed that all equipment manufactured by the beekeeper should be built to standard specifications.

Home-made appliances often do not fit neatly or are not square and are very difficult to use. The resale value of such material is also affected, as few beekeepers will tolerate material of this kind. Correct measurements for all types of apiary woodware can be obtained from the local Apiary Instructor.

Making a Solar Wax Extractor

A useful and inexpensive device for extracting wax on a comparatively small scale is the solar wax extractor, which utilises the sun's heat to melt the wax. It consists fundamentally of a box with the top covered with glass. The woodwork should be substantial and well made so that it will withstand and retain the sun's heat.

The box should be about 5 ft 3 in. long and 2 ft 8 in. wide. The depth should not exceed about 4½ in. A sheet of flat iron is placed on the floor of the box and turned up at the sides. For the top a sash is made and fitted with two sheets of glass with a 1 in. space between them. At one end of the box a trough about 8 in. wide and 3 in. deeper than the floor of the box is fitted into which the melted wax can run and be allowed to accumulate.

Alternatively a small round opening can be made in the end of the box to allow the wax to run from the tray out into a small receptacle or mould placed on the outside of the extractor. This method is quite satisfactory provided a cover of some sort is placed over the melted wax, as this hot wax attracts searching or robbing bees.

Siting of Extractor

The extractor should be placed in a well sheltered and sunny position and tilted at an angle of about 30 degrees toward the sun so that it will receive the maximum sunshine.

A piece of clean sacking is placed on the flat iron and the comb or wax to be melted is laid on the sacking.

As the wax melts it will run down into the trough (or out into a mould if this method is used), and the propolis or other rubbish commonly called "slumgum" will be left behind on the sacking.

When a solar wax extractor is used, it is seldom necessary to refine the wax further, as usually all foreign matter is left on the sacking within the extractor. If a fair amount of wax is to be handled in this way, a supply of good sacking will be necessary and frequent changes are advised.

Popular Presents

One of the following easy-to-read books published by the Department of Agriculture will prove a popular choice for a gift for one of your friends or acquaintances:

• "Journal of Agriculture" Cookery Book	6/6
• Pasture Production in New Zealand	2/6
• Farming in New Zealand. Volume I	8/6
• Primary Production in New Zealand	2/6
• Food and Health	1/6
• The Child and His Family	1/-
• Poultry Feeding	1/-
• Crop Production	2/-
• Chick Raising	1/-
• Glasshouse Construction	1/6
• Chemical Methods of Weed Control	2/6
• Viticulture	2/6
• The Home Vegetable Garden	4/-

Obtainable from Main Offices of the Department, Post Free

Identification of Rats and Mice in New Zealand

MANY people are confused about the different kinds of rats in this country and have difficulty in recognising them. This is partly because there are many popular names, often quite misleading, for the same animal and partly because rats vary a great deal in colour, so that two animals which at first glance look different may belong to the same species.

By J. S. WATSON,
Animal Ecology Section,
Department of Scientific and
Industrial Research, Wellington

THERE is some practical value in being able to recognise the various rat species, because they have different habits and are not equally susceptible to the same poisons. To get rid of an infestation of rats the species present must be known so that the best methods to use against it can be decided.

There are three species of rats—the kiore, the Norway rat, and the ship rat—and the house mouse in New Zealand.

Kiore (*Rattus exulans*)

This rat, popularly known here as the Maori rat, Polynesian rat, or native rat, is found in south-east Asia, the East Indies, the Philippines, New Guinea, and on most of the Pacific Islands, but not in Australia. It was carried from one island to another round the Pacific probably as a stowaway in the canoes of the Polynesians and according to Maori tradition it was brought to New Zealand in one of the canoes of the Great Fleet, which arrived about 600 years ago. However, it is more likely that it had already come with the Moriori some hundreds of years earlier, as it was with them on the Chatham Islands before the Maoris arrived there.

The kiore was widely spread throughout New Zealand in pre-European times and the Maoris, who considered it an important food, had special traps for catching it. Soon after the first Europeans arrived it disappeared from most of the North Island. The two other rat species established themselves at about the same time, and it was generally supposed that they drove the kiore out. It lasted longer in the South Island and periodically became very numerous, particularly in the Nelson and Blenheim districts. These sudden increases in numbers probably coincided with the years when the beech trees were producing masses of seed. However, the last of these outbreaks came in 1889 and there have been very few records of the kiore since then.

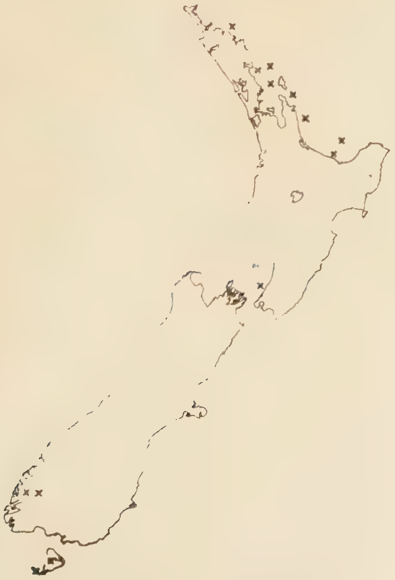


Fig. 1—Localities where the kiore has been found since 1949.

Today this rat is found on some of the off-lying islands, particularly in the north, where neither of the other two species is present, but it is also on Kapiti Island with the Norway rat and probably also the ship rat, and in some isolated localities in Fiordland and Stewart Island. The map shows the places where it has been found in the last 10 years. The kiore is so locally distributed that it is generally of no economic importance, though on some of the Pacific islands it is abundant and damages native crops. In New Zealand it usually feeds on berries, seeds, and occasionally insects.

Appearance and Habits

The kiore is the smallest of the three rat species and rarely weighs more than 4 oz. The length of the head and body of a full-grown animal is about 6 in. and the tail is about the same length, though it may be slightly shorter or longer than the head and body. The ears are relatively large and thin. It has a greyish brown back and is pale grey underneath. Many people believe that the small blue-grey rat sometimes found in the bush is the kiore, whereas this is really the young of the black form of the ship rat.

The kiore lives chiefly on the ground, nesting in hollow logs and

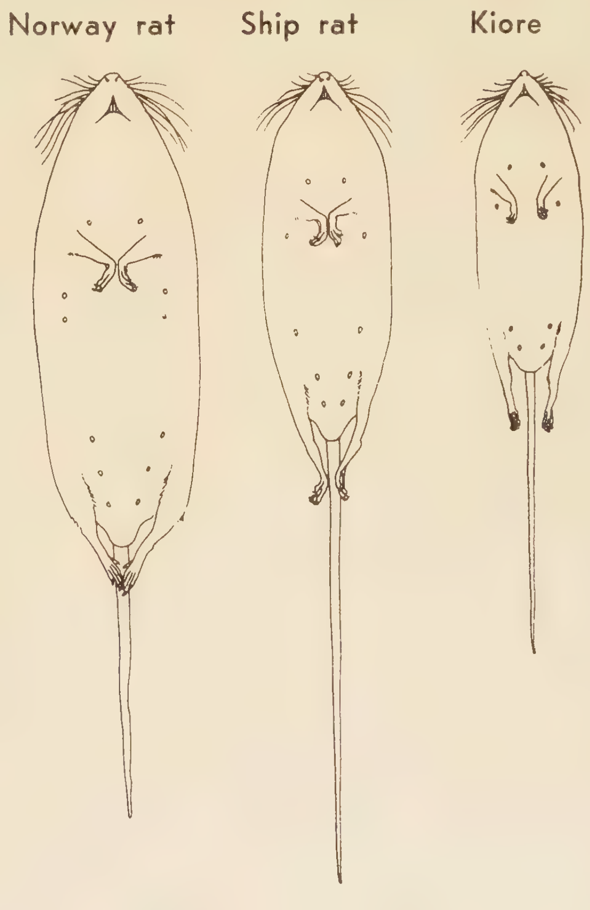


Fig. 2—The number and arrangement of teats and differences in tail length in females of the three rat species.

under rocks or other cover. The usual number in a litter is 5, though up to 8 have been found, and the main breeding season is probably in late summer.

Norway Rat (*Rattus norvegicus*)

The Norway rat, so called because it was first described from specimens collected in Norway, came originally from the plains of Central Asia. It gradually spread westward and reached Britain a little more than 200 years ago, where it eventually occupied the whole country and replaced the ship rat, which is now found only in the ports. It came to New Zealand with the whalers and sealers, whose bases, littered with decaying meat and offal, provided it with ideal conditions. Charles Darwin found it at the Bay of Islands at the time of his visit in H.M.S. Beagle in 1835.

It is now distributed throughout the country, more particularly in towns and around houses, but may be found in remote places, especially along creeks. It is established on sub-Antarctic Campbell Island and sub-tropical Raoul Island in the Kermadecs. It is popularly known as the common rat, brown rat, grey rat, sewer rat, or water rat.

Appearance and Habits

The Norway rat is the largest of the three rat species. Full-grown animals may weigh as much as 1½ lb. and 1 lb. is quite usual. The length of the head and body may be up to 11 in. and the tail is always shorter than the head and body. The ears are relatively short, thick, and covered with small hairs; if bent forward they do not reach as far as the eye. Most Norway rats are greyish brown on the back and pale grey on the under side.

In London, Berlin, Paris, and some other large European towns about one in 75 of these rats is black, usually with a white spot on the chest. This rare melanic form has not so far been found in New Zealand, though it may well turn up when more rats have been carefully examined. The domesticated white rat is the albino form of this species.

Norway rats are burrowing animals and live and nest in holes in the ground often under the floors of buildings. As they do not mind cold and damp, sewers provide them with an ideal habitat with ready-made tunnels where they are undisturbed and where there is a constant supply of food scraps washed down from kitchen sinks. They have been found living and breeding in cold stores maintained at a constant temperature of 20 degrees F. below freezing.

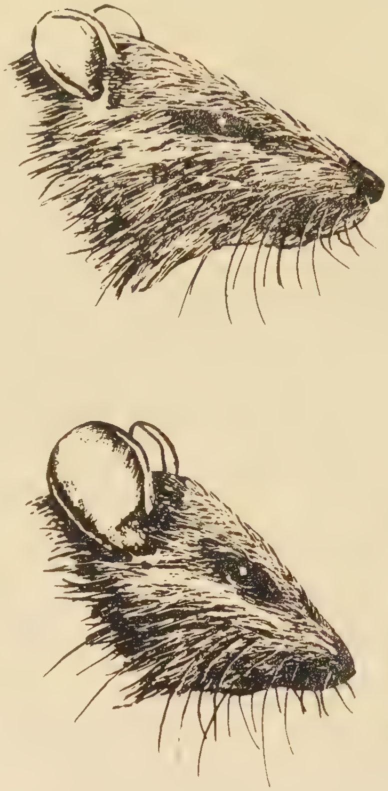


Fig. 3—Heads of the Norway (top) and ship rat, showing difference in the size of the ear.

They readily enter water and often make their holes along the banks of rivers and creeks, where they feed on freshwater mussels and crayfish which they collect from the stream bed. As a result they are sometimes referred to as water rats, though the animal known by this name in England (the water vole) is not found in New Zealand.

Norway rats are attracted wherever food is easily obtained, particularly to rubbish dumps, pigsties, chicken runs, and the like and will often make their way into buildings through faulty drains connecting the sewers or through holes in the wall near ground level.

These rats do not have any well marked breeding season, but may produce their litters at any time of the year, the average number in a litter being about 8, though up to 12 is not unusual.

Ship Rat (*Rattus rattus*)

This rat, also commonly known as the black rat, bush rat, house rat, or roof rat, probably came originally from south-east Asia and gradually spread westward. It reached Britain about 800 years ago probably in the ships carrying the soldiers returning from the Crusading wars in the Middle East. Before this time there were no rats in Britain.

It was the common rat in Europe until the end of the 18th century and as it readily adapts itself to life on ships, which before the use of fumigation were often heavily infested, it has been carried to most parts of the world. It is now generally distributed, particularly in seaport towns, and is very numerous in tropical and sub-tropical countries. Where bubonic plague occurs this species is usually the main carrier, though both the other two species can and sometimes do carry the disease. Most ships reaching New Zealand in the early days would have had some of these rats on board, and if the first ones did not come with Captain Cook, they would have arrived soon afterward. Today the ship rat is generally spread throughout New Zealand. It is found in houses both in town and country, and is the common rat in the bush.

Appearance and Habits

This rat when full grown weighs up to ½ lb. The length of the head and body is about 9 in., and the tail is almost always longer than the head and body. The ears are thin, hairless, and rather large, so that if pushed forward, they will cover the eyes.

Rats of this species are very variable in colour, and there are three distinct colour forms. One has a brown back and a white or creamy under side, the second has a black or bluish black back and grey underside, and the third has a brown back and grey under side.

The first of these is the commonest in this country, but about one in five is the black form, though the proportion varies from place to place. The black was the common form in Britain before the arrival of the Norway rat, which explains why this species is sometimes referred to as the black rat. The third form is rather rare in New Zealand and has so far been recorded only from Stewart Island, Westland, and the main ports.

These three varieties, though quite different in colour, are similar in other respects such as shape and habits. They all belong to the same species, as they freely interbreed and their young may be any of the three forms. The different rat species do not naturally interbreed and attempts to cross them in laboratories have failed.

The ship rat is essentially an arboreal animal. In the forest it makes its nest among the branches of bushes, in clumps of kiekie and other plants growing on trees, or among the dead leaves of cabbage trees. The nest, which is somewhat like a sparrow's, is a loosely built ball of dead leaves and grass, in the middle of which the young are born. In houses it nests inside hollow walls, in attics, in old cupboards, or in similar undisturbed corners. It breeds throughout the year, but more prolifically in spring and autumn. About 6 young are born in a litter.

Ship rats seldom live with Norway rats, and though both may sometimes occupy the same building, the ship rat will usually be on the top floor or under the roof and the Norway rat in the basement and on the lower floors. Though the Norway rat has replaced the ship rat in England, it does not seem to be doing so here. There is apparently plenty of room for both and there are infestations of each species in most New Zealand towns.

House or Field Mouse
(*Mus musculus*)

The house mouse has been in Britain, Europe, and Northern Asia since prehistoric times. As it is so small and likes to live in close association with man, it is easily transported in boxes and bales of goods. In this way it has been carried round the world and is now well established in most countries. It was reported at the mission station in the Bay of Islands in the early 1830s and appeared in Dunedin 2 years after the city was founded.

It can now be found wherever there are houses and also far out in the bush and even up to grassy mountain tops. Mice are also present on many of the off-lying and subantarctic islands.

There is only the one kind of mouse in New Zealand, but as so many of them live out of doors well away from houses, many people wrongly imagine that there are two different species, a house mouse and a field mouse.

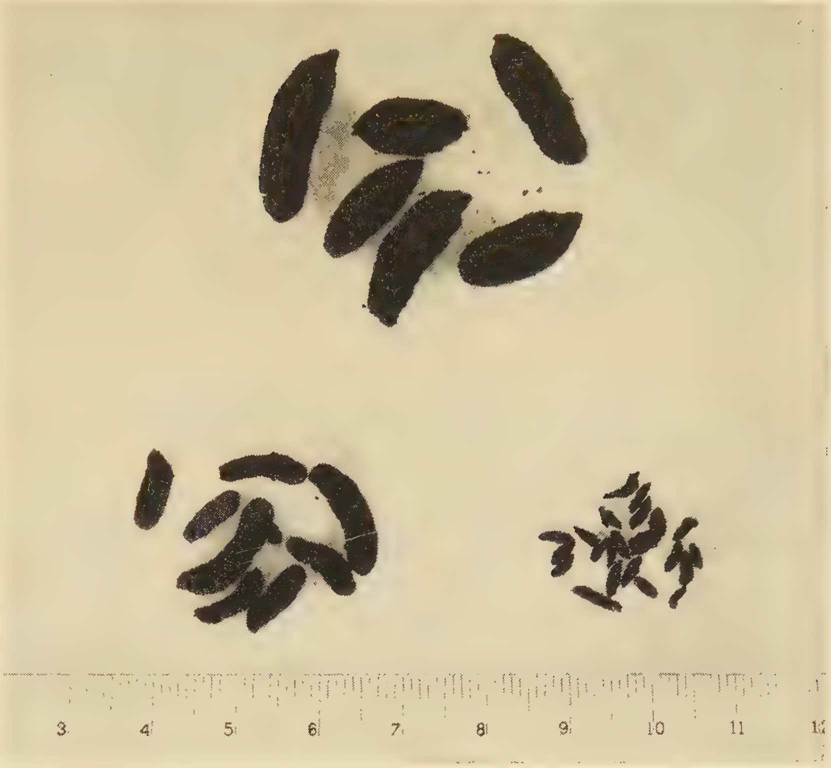


Fig. 4—Droppings of Norway rat (top), ship rat (left), and house mouse (right). The ruler is graduated in centimetres.

Appearance and Habits

A full grown mouse seldom weighs more than 1 oz. The length of its head and body is about 3 in. and the tail is usually slightly longer. Its colour is an almost uniform dark grey-brown above and buffy-grey below. The white mice which are often kept as pets by children are albino house mice.

While mice may live in holes in the ground or in walls, they can climb easily and will make their nest wherever there is suitable cover within reach of food. A mouse's daily range of movement may be quite small where all its requirements can be met close at hand and the area covered may be as small as 50 sq. ft. This makes a mouse infestation in a large grain or seed store particularly difficult to eliminate, as mice may live in the middle of a large stack of bagged grain without ever coming to the edge, where they can be dealt with.

Mice do not have a clear-cut breeding season, but may produce young at any time of the year. About 6 are born in each litter and each adult female may produce about 5 litters per year. The size and number of litters produced depend on the amount of food available.

Identification

The table below sets out the main characters that are a help in recognising the different rat species. Few of them are sufficiently precise by themselves to show the identity of a rat, and some are little more than rough guides that can usually, but not invariably, be depended on. They are listed approximately in the order of their reliability. As many of these characters as possible should be looked at when trying to identify a specimen.

The number of teats is probably the best character, but is the most limited in its use, for they can be seen easily only on nursing females. The teats are in pairs on the chest and lower belly (Fig. 2) and the number of pairs is different in each of the three species.

The size of a rat, most conveniently indicated by its weight, has a definite, though limited, value. Large rats weighing more than ½ lb. can safely be identified as Norway rats and any rat of more than 4 oz. cannot be a kiore.

The size and shape of the ears distinguish the Norway rat from the ship rat and kiore (Fig. 3), but not the ship rat from the kiore.

The length of the tail is also useful for separating the Norway from the ship rat, but is no help with the kiore. Some care has to be taken when using this character, as rats quite often lose a bit of their tail, and a few ship rats (about 1 in 100) may have a tail slightly shorter than the head and body.

CHARACTERS USEFUL FOR IDENTIFYING THE DIFFERENT RATS

Character	Norway rat	Ship rat	Kiore
Number of teats on female	12	10	8
Maximum weight ..	1½ lb.	½ lb.	¼ lb.
Ears	Small, do not reach eyes when pulled forward	Large, cover eyes when pulled forward	As ship rat
Tail	Shorter than head and body	Longer than head and body	Shorter or longer than head and body
Fur on under side ..	White hair over grey underfur	Uniform colour, either all white or grey	As Norway rat

The colour of the fur on the under side is a help in identifying the kiore. The ship rat, which it more nearly resembles, particularly in the size of the ears, has the under side coloured white or grey and the fur is usually almost uniform in colour, whereas in the kiore white hairs overlie the dark grey underfur.

In New Zealand the kiore is so rare that few people are likely to come across it. The Norway and the ship rat are the two species living around buildings that need to be distinguished and the easiest way of doing this is by the size of the ear and the length of the tail.

Mice can be easily recognised by their small size and short, close fur. Occasionally they may be confused with very young rats just out of the nest, but their small feet should make their identity clear—the hind foot of a house mouse is never more than ¾ in. long; the smallest rat always has a hind foot longer than this.

Signs and Traces

Even if a specimen of a rat cannot be caught for identification, it is often possible to tell which species is present from the signs and traces that the rats leave behind them. As has already been pointed out, Norway rats live in burrows, so rat holes in the ground are sufficient by themselves to indicate the presence of this species.

The way that rats enter a building may also be an indication of the species. Rats coming in through faulty drains would be Norway rats, while those coming in through holes in the roof would be ship rats. The latter are much more agile and can climb in places that are inaccessible to the other species. They will run along beams supporting the ceiling and where their path is blocked by the joists they swing under them and back on to the beam and in so doing they leave a dirty smear on the side of the beam. These curved smears under each joist are characteristic signs of ship rat infestation, as the Norway rat cannot perform this acrobatic feat. These smears along the beams will remain visible for many years and therefore are not necessarily an indication of rats in the building at the moment, but if the rats are using the beams as runways, these smears will be slightly tacky to the touch.

Droppings

Rats can also be identified by their droppings, and though it is not always possible to identify one dropping with certainty, there are usually enough characteristic ones about to be fairly certain which rats produced them.

Fig. 4 shows typical droppings of the Norway rat, ship rat, and house mouse. Kiore droppings cannot be distinguished from those of the ship rat. Norway rat droppings are usually described as spindle shaped, long oval with pointed ends, and they are often deposited in groups. Those of the ship rat are thinner and often slightly curved or sausage shaped and are scattered where the rats have been running. Mouse droppings are very much smaller, looking at first glance like spilt dry tea leaves.

Reactions to Poisons and Traps

The subject of rodent control in New Zealand was dealt with by McIntosh and Adams in "The New Zealand Journal of Agriculture", March 1955, and only differences in the various species which affect control will be dealt with here.

There are some marked differences in the susceptibility of the rat species to various poisons. Two substances that have been much used in various commercial brands of rat poison are red squill and antu. These poisons can be very effective when properly used against Norway rats, but both the ship rat and the house mouse are relatively resistant to them so that they are inefficient to use against these species.

Before either of these poisons is bought it is as well to make sure that an infestation of Norway rats has to be dealt with. Not much is known about the kiore's reactions to poisons, but it has been reported that warfarin, which is effective against the other two species, is much less so against the kiore.

The various species also react differently toward baits and traps. Norway rats are especially wary of any new object that is placed within their living area, so when treatment with a quick acting poison is carried out, feeding with unpoisoned bait for some days beforehand is essential.

With trapping best results are obtained by leaving traps baited but unset for a few days; even so, it is very difficult to catch all the rats and some usually learn to avoid the traps. Though ship rats are not as wary as Norway rats, poisoning should still be preceded by pre-baiting, but it is often possible to clear out a small colony by trapping. House mice can quite easily be eliminated by trapping or by poisoning, but as the mice move over such short distances, it is especially important to put out plenty of traps or poison baits so that some are within the range of every mouse. Pre-baiting is usually unnecessary when poisoning mice.

Meteorological Records for February

Station	Height of station above M.S.L. (ft.)	Air temperatures in degrees (Fahrenheit)				Rainfall in inches					Bright sunshine hours
		Approx. mean	Difference from normal	Absolute maximum and minimum		Total fall	No. of days of rain	Difference from normal	Maximum fall		
				Maximum	Minimum				Amount	Date	
Kerikeri	240	66.7	+ 1.1	80.6	48.2	3.27	11	— 0.90	1.65	9	190
Auckland	160	67.6	+ 0.9	78.7	51.8	1.89	12	— 2.02	0.68	10	208
Tauranga	12	66.0	+ 1.0	83.2	40.9	3.81	10	+ 0.08	1.01	23	227
Ruakura	131	64.4	+ 1.1	80.9	40.2	2.93	10	— 0.15	1.18	23	215
Whakarewarewa ..	1,006	63.3	+ 0.9	78.3	41.4	4.90	12	+ 0.98	1.44	10	188
Gisborne	14	65.4	+ 0.3	85.0	46.2	1.56	12	— 1.49	0.36	23	194
New Plymouth ..	160	64.2	+ 1.7	79.9	46.2	5.46	7	+ 1.48	2.83	10	232
Napier	5	65.8	+ 0.4	84.1	46.2	3.56	9	+ 0.88	2.26	22	199
Kariol	2,125	58.9	+ 1.3	78.5	38.0	5.50	9	+ 1.45	2.92	22	
Wanganui	72	64.0	+ 0.3	81.3	47.1	6.06	7	+ 3.09	2.14	21	211
Palmerston North ..	110	63.2	+ 0.7	82.7	41.2	2.89	7	— 0.20	1.36	10	194
Waingawa	340	62.3	— 0.1	83.4	42.6	2.64	9	— 0.17	1.79	22	170
Wellington	415	61.8	+ 0.5	74.9	46.8	2.05	7	— 1.23	0.72	9	210
Nelson airfield ..	5	63.2	+ 2.0	80.3	44.0	0.41	3	— 2.21	0.34	9	239
Blenheim	12	63.6	+ 0.8	88.0	35.0	0.38	5	— 1.76	0.18	9	208
Hokitika	15	58.0	— 0.1	70.6	39.2	5.44	10	— 2.28	3.64	9	206
Hanmer	1,270	59.5	+ 0.1	87.0	30.0	3.32	6	— 0.33	1.54	22	170
Christchurch ..	22	62.7	+ 1.9	89.2	43.2	1.71	4	— 0.09	1.34	21	204
Ashburton	323	63.4	+ 2.4	93.2	41.2	2.59	6	— 0.10	1.85	21	185
Timaru	56	61.7	+ 1.5	89.1	39.7	1.70	8	— 0.52	0.88	21	182
Alexandra	520	62.4	+ 1.0	86.2	33.2	0.45	6	— 1.02	0.25	9	200
Taieri	80	58.6	+ 0.9	87.6	30.4	2.21	10	— 0.10	0.65	17	170
Invercargill airfield ..	0	57.1	+ 0.9	81.3	27.7	4.55	16	+ 1.20	1.10	2	171
Chatham Islands ..	150	59.5	+ 1.1	71.7	45.4	3.19	13	+ 0.80	0.62	10	

SUBSCRIPTION RENEWALS

Renewals of subscriptions to "The New Zealand Journal of Agriculture" should be paid to the nearest office of the Department of Agriculture. Subscribers can ensure continuity of delivery by paying their subscriptions as soon as possible after receiving their renewal notices and at least 1 month before the old subscription expires. When payment is made the renewal notice should accompany the subscription to ensure that the correct details are recorded.

[*National Publicity*

Aerial Topdressing Measurement Trials

By JEAN G. MILLER, Biometrician, and N. S. MOUNTIER, Research Officer, both of the Department of Agriculture, Wellington

AERIAL topdressing of hill country with fertiliser, particularly superphosphate, has been a regular practice in New Zealand since 1949. During the development stages and in the years since, the Department of Agriculture has conducted experiments to measure the spread of this fertiliser on the ground. The results of some of these trials have been published in detail (see "References"), but others have only been reported privately to those concerned with the particular trial. It is desirable to have all the results available together, and this article summarises all the main results of the trials conducted before 1957.

DIFFERENT types of aircraft have been used to drop superphosphate in many different forms. The spread and the accuracy with which material is dropped on to a given target area are greatly affected by both the weather at the time of the drop and the range and average size of the particles in the material. A precise comparison of the relative efficiency of the different aircraft would be fair only if measurements of spread were made when each was flown at its best operating height and speed and when using the material most suitable to it for any given conditions. Unfortunately it has not been possible to conduct enough trials to determine the best conditions for the different aircraft.

The performance of each aircraft has been assessed only under the conditions stated and for the specific types of material dropped, and results must not be considered to be generally applicable to all conditions.

Methods of Measuring Spread

Though the greatest advantage of using aircraft for dropping fertiliser is in the topdressing of hill country on which wheeled vehicles cannot be taken, most measurement trials are conducted on flat or nearly flat areas. In hill country it is too difficult to measure distances accurately and to find areas sufficiently uniform that local variations do not upset results, though in practice local irregularities in the ground cause extra variability in the density of material from point to point. In trials, where only a very small fraction of the target area is included in the sample taken for measurement, it is obviously desirable to eliminate these effects, particularly where comparisons are being made.

In each trial a target area was marked out and catchers placed in a regular pattern. Canvas catchers were used in the first experiment, then cardboard boxes, and finally kerosene tins. The tins appear to be the most satisfactory catchers.

The pattern in which the catchers were set out was also changed from experiment to experiment, but in most trials it was made up of rows at right angles to the line of flight of the aeroplane. The object was always to obtain a general pattern of fertiliser distribution, but in the later experiments attention was directed particularly to determining width of swath from one run of the plane.

The fertiliser collected in each catcher was taken to the laboratory for accurate weighing and results were then converted to equivalent rate per acre. Traces of fertiliser often drift over quite a large area, but the rate of application over much of it is so small as to be worthless. Therefore it is convenient to set ½ cwt. per acre as the minimum effective rate. The area receiving ½ cwt. per acre or more and the width of spread to ½ cwt. per acre limits are used as criteria in this report.

In some trials sample catches were sieved to determine the distribution of particle size.

PLAY SAFE

AVOID COSTLY REPLACEMENT . . .

"Tanalised" Timber is as good as money banked. "Tanalised" fence posts, battens, stock yards, gates stay trim year after year.

"TANALISED" TIMBER is pressure - treated with

'Tanalith' C

the permanent preservative that remains 97% fixed, even under the very worst conditions

"TANALITH" C is the most widely used preservative in the world and is now used in 31 countries.

"TANALITH" C is a compounded all-purpose preservative containing toxic-chemicals which mean death to borer and termites, and protection against rot and decay.

"TANALISED" TIMBER is clean, odourless, non-corrosive to wire and metal fittings, glueable, non-inflammable and can be stained, painted or varnished.

Don't take chances on upkeep—protect your farm and your pocket—specify "TANALISED" TIMBER.

IMPORTANT

Be sure you specify *ground contact* grade when ordering "Tanalised" timber for outdoor use.

'Tanalised'
pressure treated **Timber**

Available from Timber Merchants.

Full details from
HICKSON'S TIMBER IMPREGNATION CO. (N.Z.) LTD.

P.O. Box 3762, AUCKLAND. Tel. 41-915

GREATEST FARMING DEVELOPMENT OF THE CENTURY . . .

The sign above symbolizes the merging of the two greatest pioneering organizations in the history of agricultural mechanization—the organizations which revolutionized farming with the Ferguson System Tractor and the Self-Propelled Combine.

All their products are today sold under the name Massey-Ferguson.

This means superb engineering and manufacturing resources streamlined to supply a complete range of farm machinery. It also means a standardization of Implements, Service and Spares centred on the Massey-Ferguson Dealer Organization—the finest of its kind in New Zealand.

Fully-equipped workshops and highly-skilled staff will ensure the highest standard of after-sales service, based on an adequate supply of replacement parts for all repairs and service in the field.

MASSEY-FERGUSON

Sole N.Z. Distributors: C. B. NORWOOD LTD., Box 298, Wellington.

Dealers in all Leading Towns

EAST
NORTH
SOUTH
WEST

RENOWN Pumps are used EVERYWHERE!

over 30,000 in daily use.

MANUFACTURED BY:—

W. H. PRICE & SON LTD.

34-36 MANCHESTER ST., CH'CH. P.O. BOX 1084.

Trial with Grumman Avenger, 1949

This was the first large-scale measurement trial conducted by the Department of Agriculture. During 1949, the RNZAF had made a Grumman Avenger available for widespread experimental topdressing of properties in the Wairarapa and a technique had been evolved. In all operations ground staff and radio were used to guide the pilot accurately on to his lines of flight, which were spaced evenly at 2 chain intervals. This practice was followed in the experiment, which was conducted on the Ohakea aerodrome.

The aim was to topdress an area 12 chains wide with six runs of the aircraft. Two hundred canvas catchers were spaced evenly over the target area. The length of each run during which the hopper was open was 40 chains. On one of the runways of the aerodrome which crossed the target area some more detailed measurements were obtained. The fertiliser dropped was double-screened hillside superphosphate with granules between ⅜ and ½ in. in diameter. The aircraft flew at 400 ft. and there was a light variable wind of about 7 m.p.h.

Measurements showed that the fertiliser was deposited in bands with density of up to 6 cwt. per acre at the centres. These bands were, however, by no means evenly spaced (see Fig. 1), despite precision flying. This could have been caused by a variable sideways displacement due to changes in wind speed or direction.

The shape of the distribution curve for a single run was estimated as far as possible from the runs which did not overlap. It was then calculated from the measurements taken on the cross runway that if the lines of flight were to be spaced at 1½ chain intervals and the rate of discharge from the hopper correspondingly reduced, an even spread would be obtained with the density at all points being within the range of 2½ to 4½ cwt. per acre.

However, it was shown in this trial and confirmed in later ones that it is impossible to lay down the bands with their centres at regular intervals; no matter how good is the flying this ideal spread is never likely to be achieved.

Factors Affecting Efficiency in Aerial Topdressing

Though the series of trials reported in this article does not allow of precise evaluation of various factors governing the efficiency of aerial topdressing, the following conclusions can be fairly drawn:

1 Unless special precautions are taken, a single application of fertiliser applied from an aeroplane is likely to be very unevenly distributed. This applies whether or not the material is granulated; in fact, powdered materials, particularly where use can be made of crosswinds, are probably more evenly distributed than are coarsely granulated materials. The pilot's skill is probably the most important factor in securing evenness of spread. Where evenness of application is important several runs should be made over the area, a proportion of the total quantity to be applied being dropped on each run.

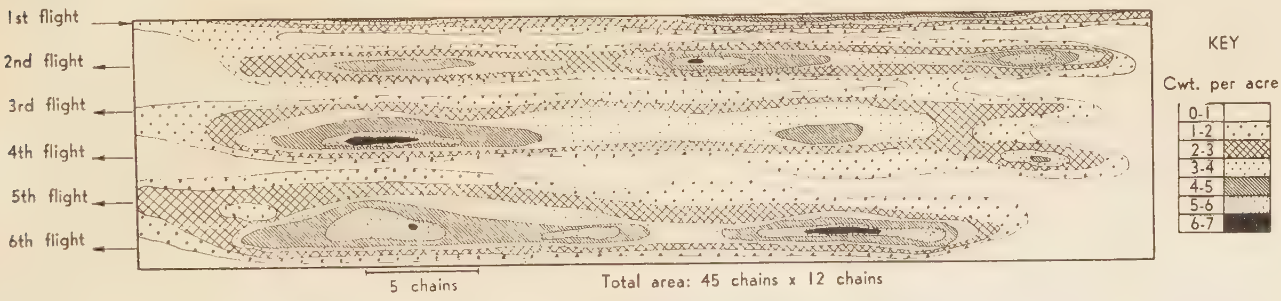
2 There is probably a serious loss of the "dust" fraction of materials dropped, especially with windy conditions and high flying. It is quite possible that much of this fine material is removed from the target area. Though the percentage lost in this manner is not known, there is sufficient evidence to show that it can be very substantial. With the larger types of aeroplane, or in any other circumstances where relatively high flying (by topdressing standards) is required, elimination of dusty material would seem to be essential.

3 Granular materials are probably dropped more precisely and must be used with applications from relatively high altitude. The most desirable type of granulation has not been established, but relatively fine granules appear to have certain advantages, particularly in securing more even application. Granular fertilisers which contain a high proportion of dust are, of course, just as likely to have this dust fraction blown from the dropping area as are powdered materials. A certain proportion of coarser granules may not be disadvantageous, especially with high flying and relatively fast aircraft. The narrowest width of spread will be achieved with coarse granules distributed from low-flying aircraft.

4 The data do not permit evaluation of the different makes of aircraft, types of hopper, etc., for efficiency of spread. Speed of flying may be an important factor that requires further investigation.

5 Wind speed and direction in relation to aircraft height and direction of flying appear to be of overriding importance in determining the type and efficiency of spread. Granulation must help to overcome the wind effect to some degree, but granular fertilisers are still markedly affected by wind drift. The skilled pilot can do much to take advantage of wind in assisting distribution, but in all operations it is a serious limiting factor. It is probable that wind conditions are rarely suitable for the application of dusty fertilisers.

▼ Fig. 1—Distribution from Grumman Avenger over whole field, showing lines of equal density.



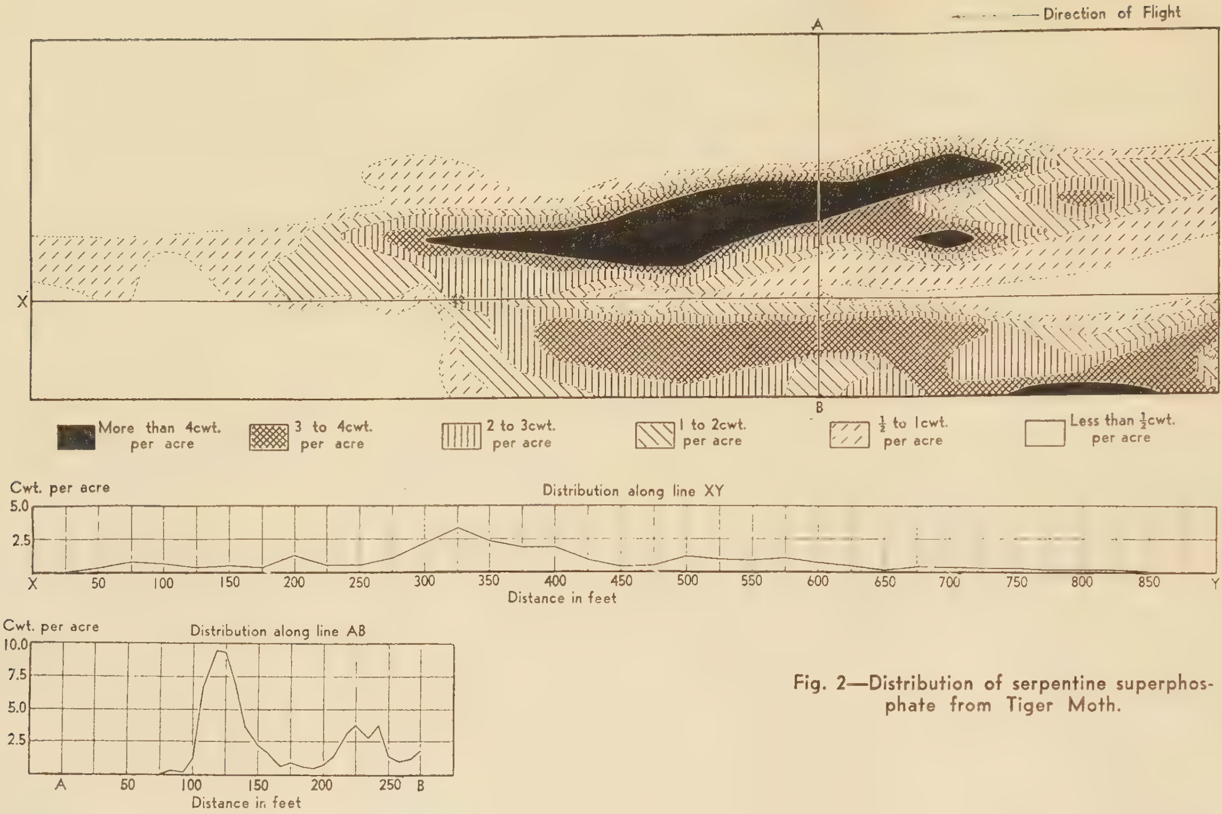


Fig. 2—Distribution of serpentine superphosphate from Tiger Moth.

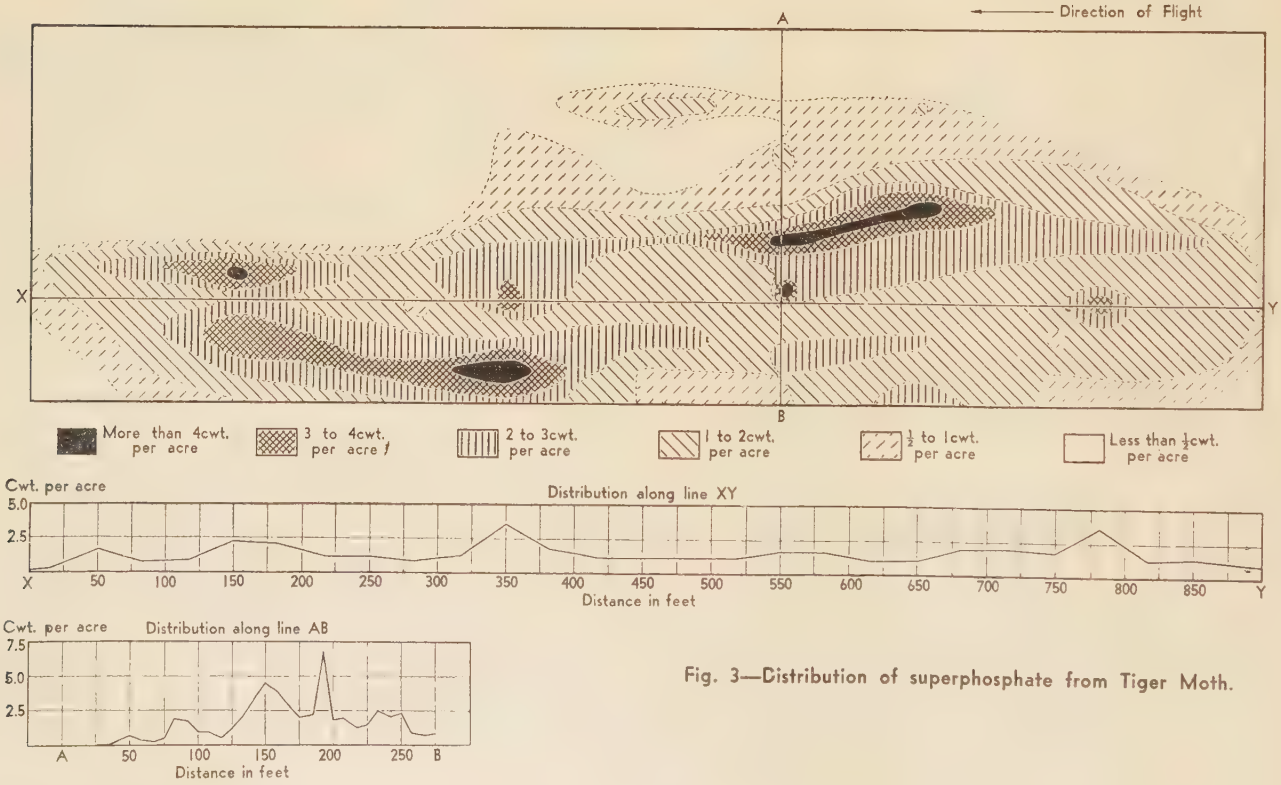


Fig. 3—Distribution of superphosphate from Tiger Moth.

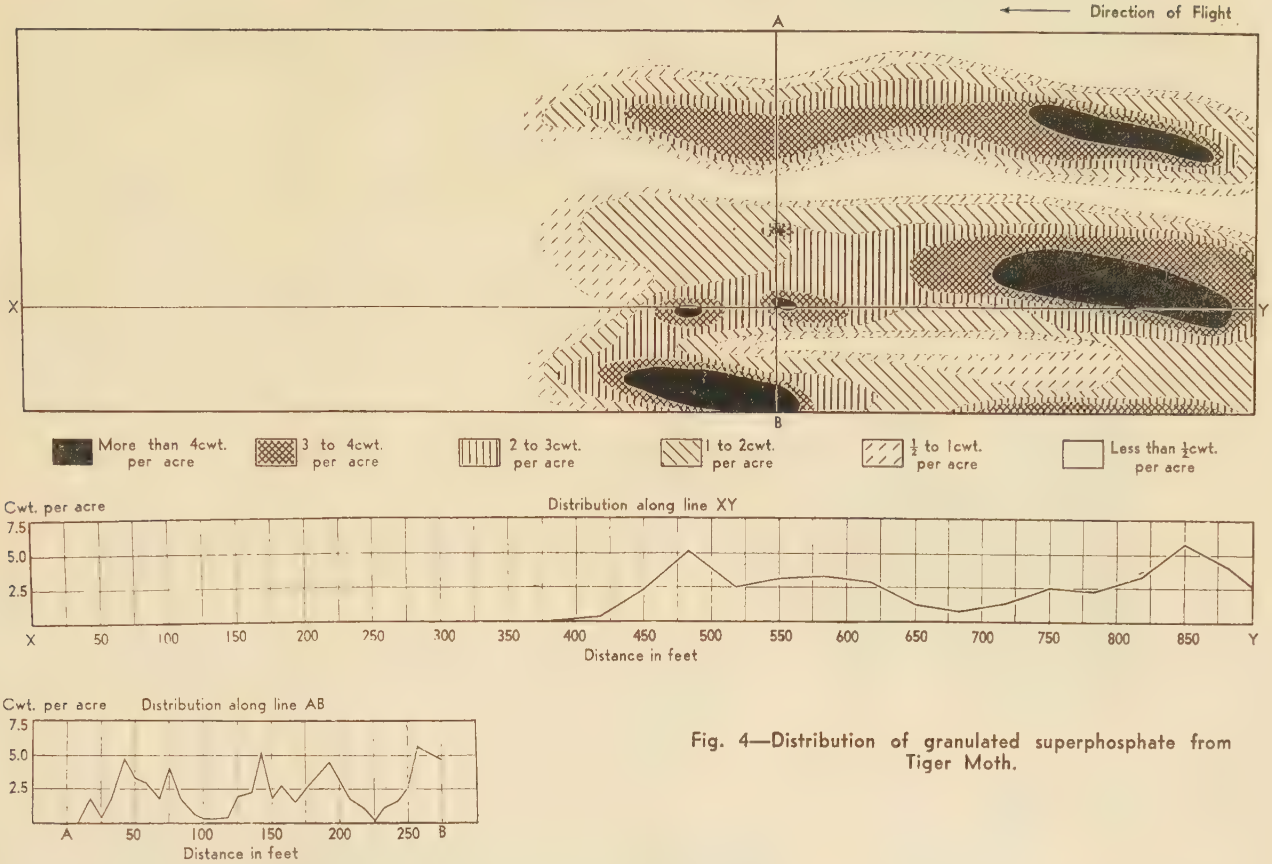


Fig. 4—Distribution of granulated superphosphate from Tiger Moth.

Trial with Light Aircraft (Tiger Moth), 1950

Because light aircraft operate without the assistance of ground control, the efficiency of fertiliser distribution from them must depend to a considerable degree on the skill of the pilot. In the detailed measurement trial conducted at Whatawhata, Waikato, in conjunction with James Aviation Ltd., an experienced pilot was operating under reasonably good practical conditions.

The purpose of the trial was simply to find the type of distribution pattern that would be obtained with this aircraft spreading each of three fertilisers: ordinary superphosphate, serpentine superphosphate, and granulated superphosphate.

The area on which the catchers (shallow cardboard boxes) were set out was not steep, though it was in hill country. The grid was spread over a target area of 5 acres, which the aircraft attempted to topdress completely with four traverses. This was repeated for each of the three fertilisers.

As the aircraft was operating under normal conditions of loading, accurate sampling of the materials to determine the size distribution of the particles was not possible. The wind at the time of the trial was light at ground level, but the pilot estimated it at between 8 and 20 m.p.h. at the altitude of the aircraft, 70 ft., and blowing approximately at right angles to the lines of flight. The speed of the aircraft was 80 m.p.h. The distribution patterns for the three forms of phosphate are shown in Figs. 2, 3, and 4.

Distribution of Serpentine Superphosphate

Wind displaced the serpentine superphosphate (Fig. 2) to one side of the target area and a considerable amount was seen to fall outside the area, despite the efforts of the pilot to allow for wind drift. Some of the material fell in quite large lumps. The main area of heavy concentration of fertiliser, which can be seen in the diagram, is probably the running together of two flight lanes.

On the 5 acres of the target area the mean density was 1.3 cwt. per acre. An attempt was made to calculate for each run of the aeroplane the proportion of the fertiliser dropped which fell on the target area. By this method it was calculated that 62 per cent of the fertiliser dropped fell on the area receiving more than ½ cwt. per acre. Since calculations showed that the remainder of the target area could not have received more than a further 8 per cent, about 30 per cent was not accounted for. Some of this loss was probably due to fertiliser bouncing out of the collecting boxes and some to fine dust drifting off the target area.

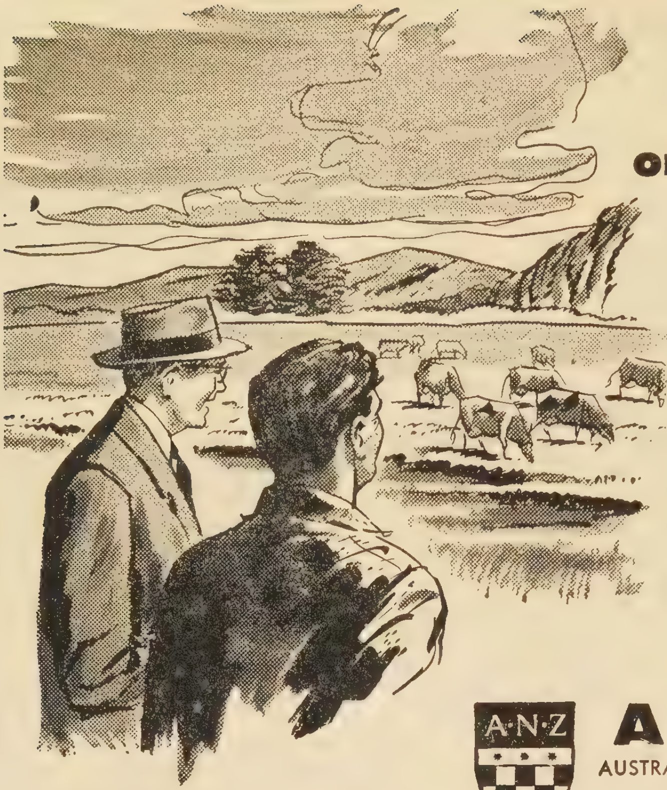
Distribution of Ordinary Superphosphate

The distribution pattern with ordinary superphosphate is shown in Fig. 3. Displacement of material to one side of the measuring area was again evident, but on this occasion the areas of heavy deposition were very small and it was not possible to identify the flight lanes.

The mean density over the target area was 1.2 cwt. per acre. Even with an estimate of the probable pattern outside the target area, less than 50 per cent of the fertiliser dropped was accounted for. The accuracy of this figure is questionable, but it seems likely that more straight superphosphate than serpentine superphosphate became airborne and drifted right away from the collecting area.

Distribution of Granulated Superphosphate

Fig. 4 shows the distribution obtained with granulated superphosphate. This material, which was imported from



Country bank manager— on the job!

The traditional idea of a bank manager as a financial wizard, impressive behind a large desk in a hushed room, is certainly not the one held by farmers who have had dealings with A.N.Z. Bank.

A.N.Z. Bank Managers get out and about, take a genuine interest in farms and farming and like nothing better than discussing things with you on the spot. Because they help so many farmers with their day-to-day affairs they accumulate an astonishing amount of specialised knowledge which is always readily at your disposal. You're very welcome to ask your A.N.Z. Bank Manager for information and guidance on farm finance whenever you need it

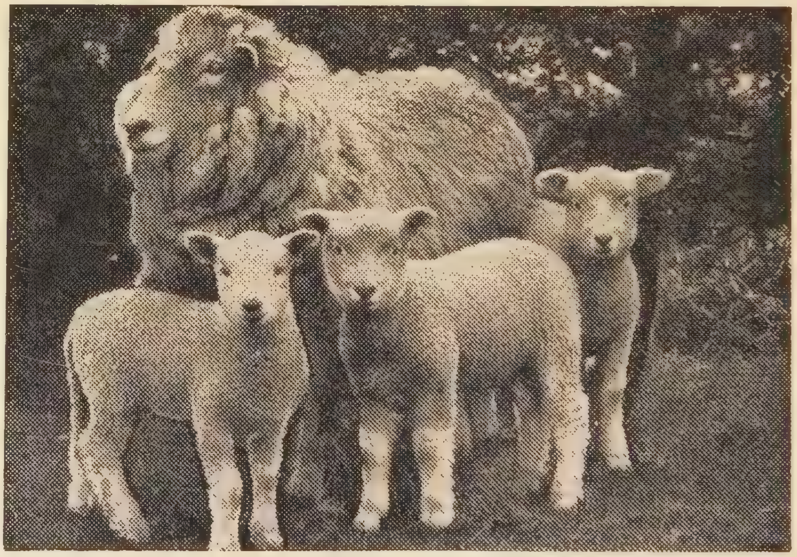
A.N.Z. BANK
AUSTRALIA AND NEW ZEALAND BANK LIMITED

ANZA.½.2.

WILL WOOL or WORMS WIN?

To get the greatest profit from your flock you must wage war on intestinal worms—they are not the least of the diseases which must be overcome to ensure a healthy flock.

Dalgety's fine-particle liquid Phenothiazine possesses all the essentials of an effective drench—it is in ever increasing demand all over New Zealand—you cannot buy better.



Obtainable from all Branches of—
Dalgety
AND COMPANY LIMITED
(Incorporated in England)

Dalgety's
FINE PARTICLE
LIQUID
PHENOTHIAZINE

England, had particles of 9/64 to 12/64 in. diameter. It flowed much more rapidly than ordinary superphosphate or serpentine superphosphate, with the result that it all fell on the first two-thirds of the grid and the last third received nothing. (Not enough of this material was available for the pilot to make a trial run on which to gauge the correct hopper opening before dropping it on the experimental area proper.) With this reservation, the pattern in Fig. 4 shows that this material fell approximately where it was intended to fall. Though the wind was stronger at this time than when the other two phosphatic fertilisers were dropped, there was no marked displacement by wind. The two central runs overlapped and the drop from the first run fell right on the boundary of the target area. The granules could be seen very easily on the ground and they extended about 4 yds. outside the measuring area. On the 5 acres of target area a mean density of 1.3 cwt. per acre was recorded.

Calculations from the pattern of a single run showed an application of only 57 per cent of the material dropped. Since the material is granular, with a negligible dust fraction, it would seem that the loss of over 40 per cent must be due to its bouncing out of the collecting boxes. If this were assumed, a correction could be made to the distribution diagram and the width of swath. However, there are two objections to such a procedure: 1. Later trials have thrown doubt on the validity of the bouncing explanation. 2. Only two-thirds of the length of the target area was dressed and consequently this two-thirds was receiving fertiliser at 1½ times the intended rate.

Fertiliser dropped on target of 5 acres	Area receiving more than ½ cwt. per acre	Mean density (cwt./acre) On target area	Mean density (cwt./acre) On area receiving more than ½ cwt.
	acres		
Serpentine superphosphate	2.8	1.3	2.2
Superphosphate	3.7	1.2	1.6
Granulated superphosphate	3.4	1.3	1.9

Trials with de Havilland Beaver, 1951 and 1953

These two trials were conducted in cooperation with Rural Aviation Ltd. at the Department of Agriculture's Flock House Farm of Instruction, Bulls, on a flat target area. They aimed mainly at the comparison of different types of granulated superphosphate when dropped from this aircraft.

In Trial 1 five materials were used and mechanical analyses of these were as follows:

Material	Per cent of material retained on *B/S sieve of mesh 8	16	30	60	Per cent which passed a 60-mesh sieve
A. Aerial mixture No. 1	2	51	31	13	3
B. Aerial mixture No. 2	83	17	trace	trace	trace
C. Aerial mixture No. 3	100	nil	nil	nil	nil
D. Granulated superphosphate	98	2	trace	trace	trace
E. "Super. compound"	10	12	23	26	29

* British standard.

The aeroplane made three parallel runs over the area for each material, flying at 200 ft. and into a light variable wind of about 7 knots. Narrow cardboard boxes 9 in. deep were used as collectors and were set out in a regular grid over all the target area.

All the granulated materials gave clearly defined band patterns of distribution, but sometimes it was apparent that two lines of flight had been very close together and the spreads had overlapped. The spread from the "super. compound" was much less regular and the density tended to vary almost as much along the direction of flight as across it.

The average widths of the bands where the density as estimated from the amounts caught in the boxes was more than ½ cwt. per acre were:

	ft.
A. Aerial mixture No. 1	72
B. Aerial mixture No. 2	66
C. Aerial mixture No. 3	54
D. Granulated superphosphate	66
E. "Super. compound"	90

The greater the proportion of finer fractions in the fertiliser the greater was the width of spread.

From one row where the boxes were at close (5 ft.) intervals detailed graphs of the cross sections of the distributions were drawn and are shown in Fig. 5. In these the spread of the different sized particles is shown. No marked consistent sideways drift was apparent, though in some runs of the finer materials, such as the aerial mixture No. 1 and "super. compound", the smaller fractions were slightly displaced relative to the larger fractions. The variable nature of this drift is probably a reflection of the changes in wind direction from moment to moment.

It had been suspected from the previous trial with the Tiger Moth that a considerable amount of the finer fractions of powdery material such as superphosphate did not fall with the main bulk of fertiliser, but floated off. One of the advantages claimed for granulated materials was the elimination of this loss and the consequently more precise dropping of fertiliser on the target. Reliable estimates of the amount of each material which actually fell on the target area were attempted. These "recovery" figures, expressed as a percentage of the material released from the aircraft, were:

	Per cent
A. Aerial mixture No. 1	72
B. Aerial mixture No. 2	68
C. Aerial mixture No. 3	64
D. Granulated superphosphate	63
E. "Super. compound"	51

These figures are all surprisingly low. It seems unlikely that the large granules would have become airborne, but it is possible that they may have bounced out of even the relatively deep boxes. No completely satisfactory explanation can, however, be given. There was a slight trend with the granulated materials toward higher recovery of smaller particles, but this could be just a chance effect. The recovery of "super. compound" was fairly clearly lower than that of the granular materials. However, with the low recovery figures of the granulated materials unexplained it is difficult to assess the amount of "super. compound" that was actually lost off the target area by becoming airborne.

In a subsidiary trial conducted later the same day the spreads were compared for single runs of the aircraft flying at 100, 200, and 400 ft. for each of two materials, "super. compound" and aerial mixture No. 1. Only one line across the target area was measured. The wind by this time was stronger than at the time of the main trial.

"Super. compound" gave a peak density of about 2 cwt. per acre at 100 and 200 ft. The wind caused sideways displacement, particularly of the smaller particles, and the displacement was rather more marked at 200 ft. These effects can be seen in Fig. 6. At 400 ft. all the "super. compound" was blown beyond the target area.

The drops of aerial mixture No. 1 also showed a sideways displacement. Here again the smaller particles were carried further than the large. The effect was somewhat greater at 200 ft. than at 100 ft., and still more marked at 400 ft.

In Trial 2 in 1953 five materials were again compared. These, chosen in light of the results of Trial 1, were:

A, sieved serpentine superphosphate 16-60 mesh.

B, a 50 : 50 mixture of sieved material and aerial mixture No. 2.

C, aerial mixture No. 1.

D, commercial serpentine superphosphate.

E, "super. compound" of the same line used in the previous year.

The mechanical analysis of the materials was:

Material	Per cent retained on *B/S sieve of mesh				Per cent which passed 60-mesh sieve
	8	16	30	60	
A	—	5	40	46	9
B	31	13	22	27	7
C	5	47	29	15	4
D	2	4	23	32	39
E	10	10	18	24	35

* British standard.

Unfortunately conditions for this trial were very poor. The wind rose quickly from 10 knots at the beginning of the trial to 18 knots, and to ensure that the fertiliser would land over the grid of boxes the pilot considered it necessary to fly at not more than 100 ft., though he may have been lower.

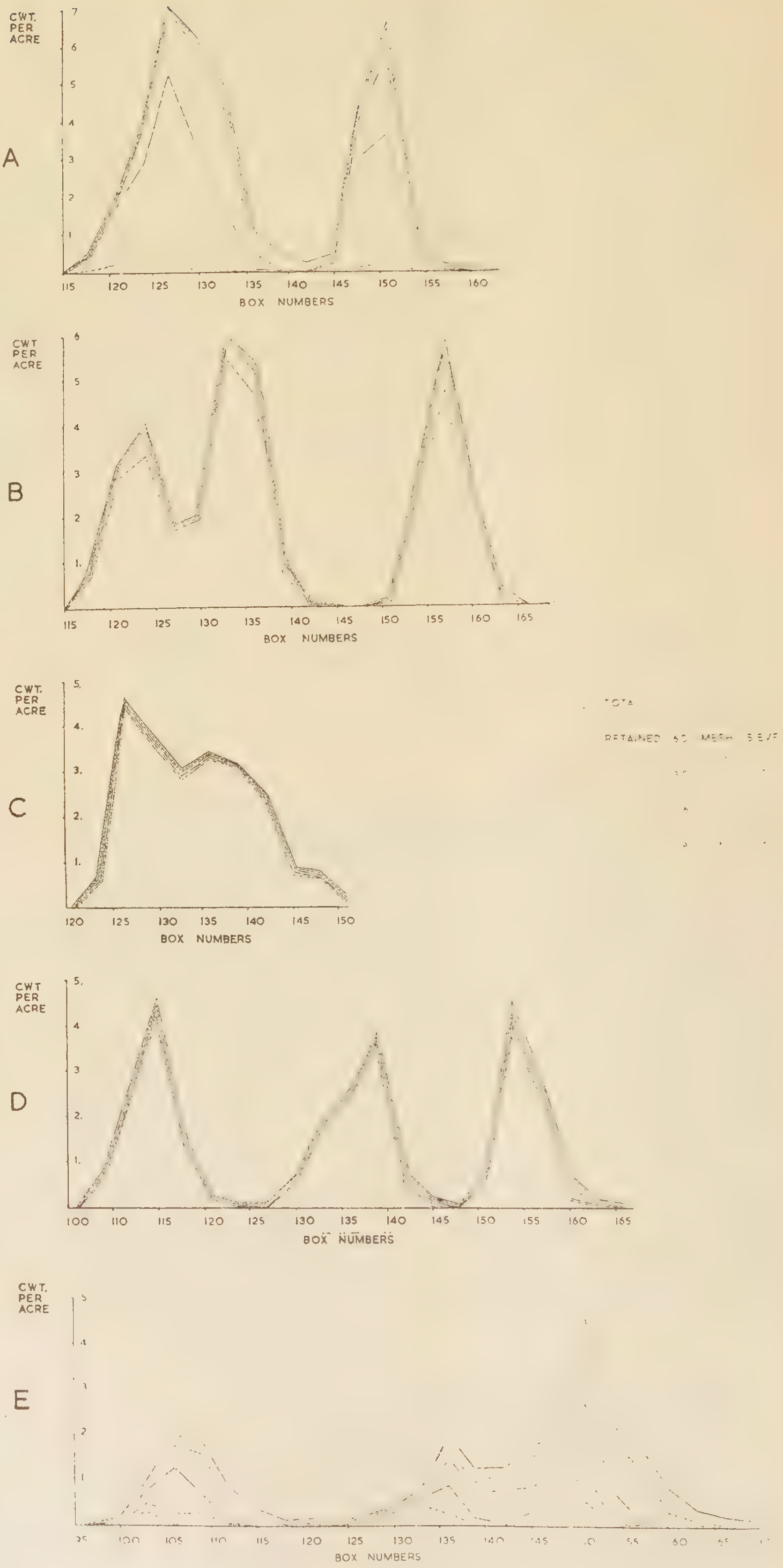


Fig. 5—Cross sections of distribution patterns for Beaver, showing relative amount of different-sized particles for all fertilisers in Trial 1. →

To try to overcome the loss due to bouncing of the granules, kerosene tins 13½ in. high were used for collecting. The grid was designed to give a good picture of the crosswise distribution and recovery of the fertiliser. The aim of the drop was to have three clearly separated swaths for each material so that width of spread could be compared and this was achieved except for material A, where the last two runs overlapped and the first run was faulty owing to a leaking hopper.

The grid had been designed with three rows of tins at 10 ft. intervals to show the crosswise distribution pattern and with a cluster of tins at each end to measure accurately the length of swath from each run. Because of the low height at which the pilot flew into the rather strong wind the width of spread of all materials was very small and the box spacing used did not show small differences in this width between different materials. In addition the rate of discharge of the materials varied considerably and the length of most swaths was not in accordance with expectations. Thus the information was not in general obtained for calculating the estimates of recovery as desired. Two runs of the materials

A and D appeared satisfactory for estimation and the results were:

	Per cent of material recovered
A. Sieved serpentine superphosphate	73
D. Serpentine superphosphate ..	54

Again the recovery for the granular material A was lower than expected, but as there was great variation between the three crosslines of the grid, the estimate is probably very inaccurate. Particle distribution in the sieved superphosphate recovered was the same as that in the original material and observations during the trial indicated that there was little if any bouncing out of the kerosene tins. So the loss of 27 per cent of this material is unexplained.

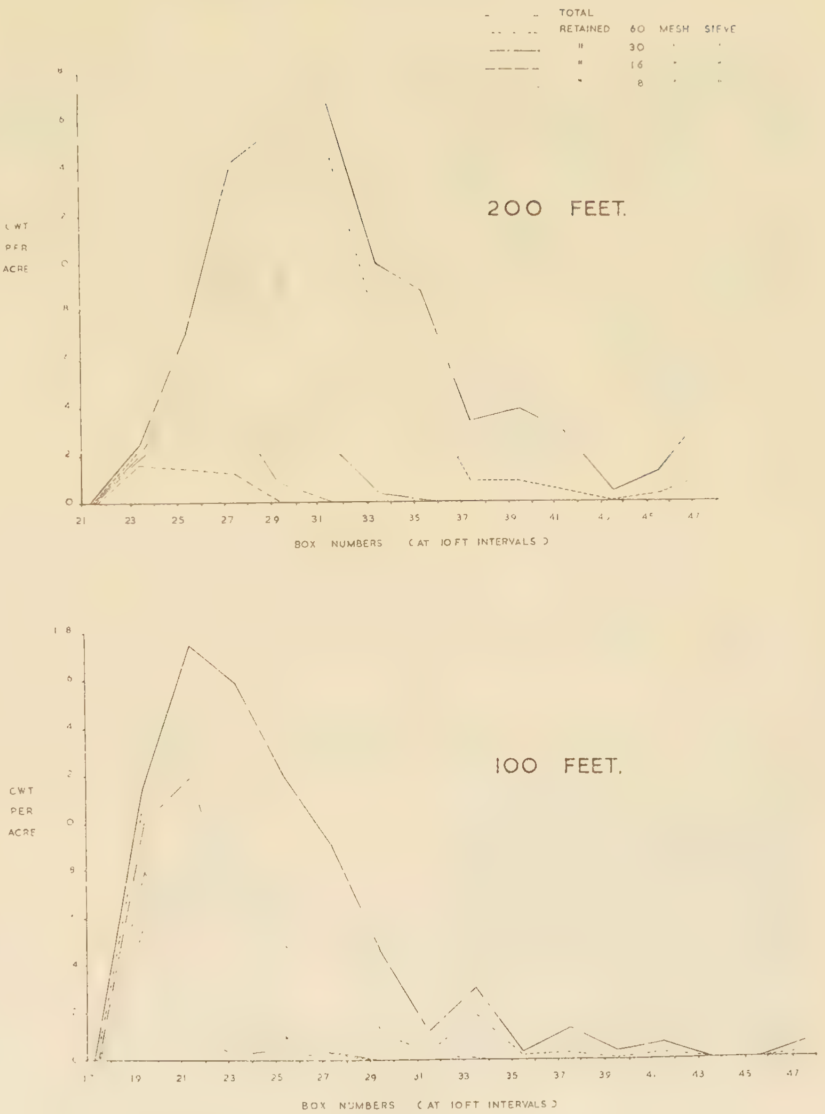


Fig. 6—Cross sections of distribution patterns of "super. compound" from Beaver flying at 100 and 200 ft.

Trial with Bristol Freighter, 1954

A measurement trial was conducted during a demonstration being given by a Bristol Freighter on a hill country station near Masterton. The load carried by this aircraft was large and was consequently spread over a large area. Since the ground was very broken, no attempt was made to measure the pattern of the complete drop. Instead, a single cross section was obtained from a grid of three close, parallel rows of kerosene tins running up and down a ridge. The grid was 20 chains long and the tins were ¼ chain apart in each row.

The material used was superphosphate on which a form of temporary granulation had been performed. This was done by adding water while the fertiliser was revolving in a concrete mixer. This gave a soft granule which tended to shatter on hitting the ground, so that an exact examination of the distribution of granule size across the line of flight was not possible. Some lumps of considerable size were formed and these dropped more or less directly under the aircraft.

The mean height of flying was 400 ft. about 200 ft. above the highest point of the grid and 600 ft. above the lowest. The indicated air speed was 145 to 150 knots. The estimated wind speed for flights 1 and 2 was 18 to 20 knots at aircraft height and 15 to 25 knots at ground level; and for flight 3, 5 to 10 knots at ground level. The wind was nearly at right angles to the direction of flight.

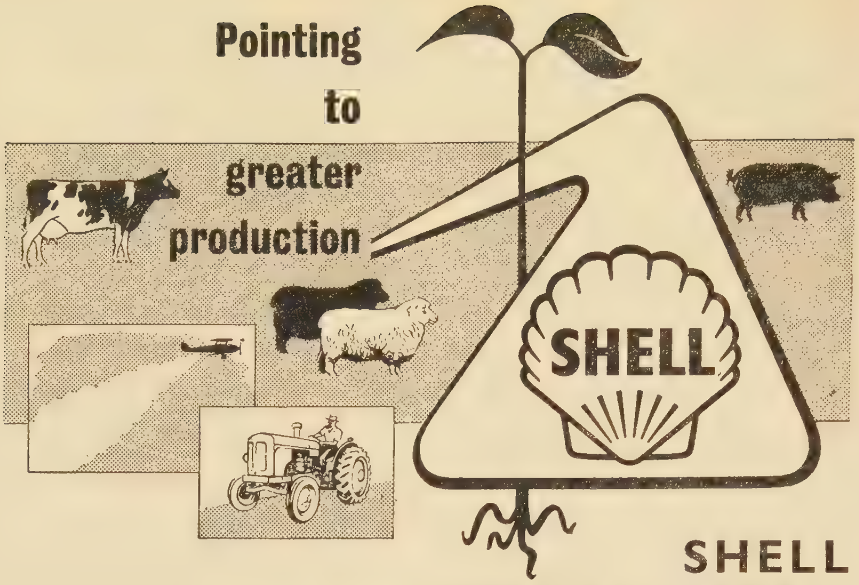
The distribution patterns are shown in Fig. 8 and the averages calculated from the three rows of the grid were:

Flight	Total width between ½ cwt. per acre limits	Total width between 1 cwt. per acre limits	Heaviest deposition	Mean rate of fertiliser applied between ½ cwt. per acre limits	Estimated amount dropped while aircraft travels 1 chain
	chains	chains	cwt./acre	cwt./acre	cwt.
1	*5	2½	1.4	0.9	0.8
2	8¾	5	2.7	1.2	1.1
3	3½	3	3.1	1.8	0.7

* A further width of about 4 chains was dressed at about 0.3 cwt. per acre.

The last column of the table has been calculated to give an estimate of the relative rate of discharge of material from the hopper at the time the aircraft was flying over the grid. It is clear that this rate was much heavier in flight 2 than in either flight 1 or 3. Only one line across the target was measured. For best results the rate of drop achieved in flight 2 is nearer that desired, though it would appear that even wider hopper openings than were used in this flight would be needed to obtain a rate of 2 to 3 cwt. per acre.

The width of spread achieved in flight 2 of this trial (8¾ chains receiving more than ½ cwt. per acre) is very much greater than that measured in any other trial. The distributions from this trial do not show the central area of very high concentration that is typical of the distributions measured from light aircraft. It appears that a heavy aircraft using granular fertiliser can make good use of wind drift. No attempt was made in this trial to meas-



ADVANCED
CHEMICAL PRODUCTS
OF THE

SHELL
AGRICULTURAL DIVISION

More effective control of parasites on livestock . . . more efficient aerial farming . . . improved selective weedkillers. These are only three aspects of modern farming in which New Zealand is showing the world the way. And with every step forward, Shell research and development has played an indispensable part. The symbol of the Shell Agricultural Division identifies the most effective and economical products of their type in the world. Through this symbol, Shell serves the man on the land — and the interests of all New Zealanders.

AGRICULTURAL CHEMICALS

Shell is the world's largest supplier of agricultural chemicals including aldrin and dieldrin AD4.8A

Hygienic food
for my stock -
as pure as my
family eats !

Pure food is the first essential for man or beast to ensure health, strength and development.

And never was healthy stock more vital than it is today to safeguard the farmer's livelihood with increased production of butterfat, meat and wool.

You are gambling with the productive capacity — even the lives — of cattle, pigs and poultry unless you insist on packaged Stockfoods in the hygienic purity of Bates Multiwall Paper Bags.

Right from Pine to Paper to Package, the vital interior walls are never exposed to contamination. And, being used once only, Bates Multiwall Paper Bags cannot circulate disease from infected farms.

Made in this Country from New Zealand grown Pine, Bates Multiwall Paper Bags use no overseas funds. They keep our spending money where it belongs — right here in New Zealand!

Speak to your Dairy Company or Stock & Station Agent about

BATES MULTIWALL
PAPER BAGS

or further particulars from the Manufacturers:

MULTIWALL BAG DIVISION **N.Z. FOREST PRODUCTS LIMITED** PRIVATE BAG, AUCKLAND.

These Stock Foods are already packed in

BATES MULTIWALL PAPER BAGS

- PIG MEAL
- CALF MEAL
- POULTRY MASH
- LUCERNE MEAL
- DAIRY SUPPLEMENTS

M9.8F

ure any possible loss of material from the target area.

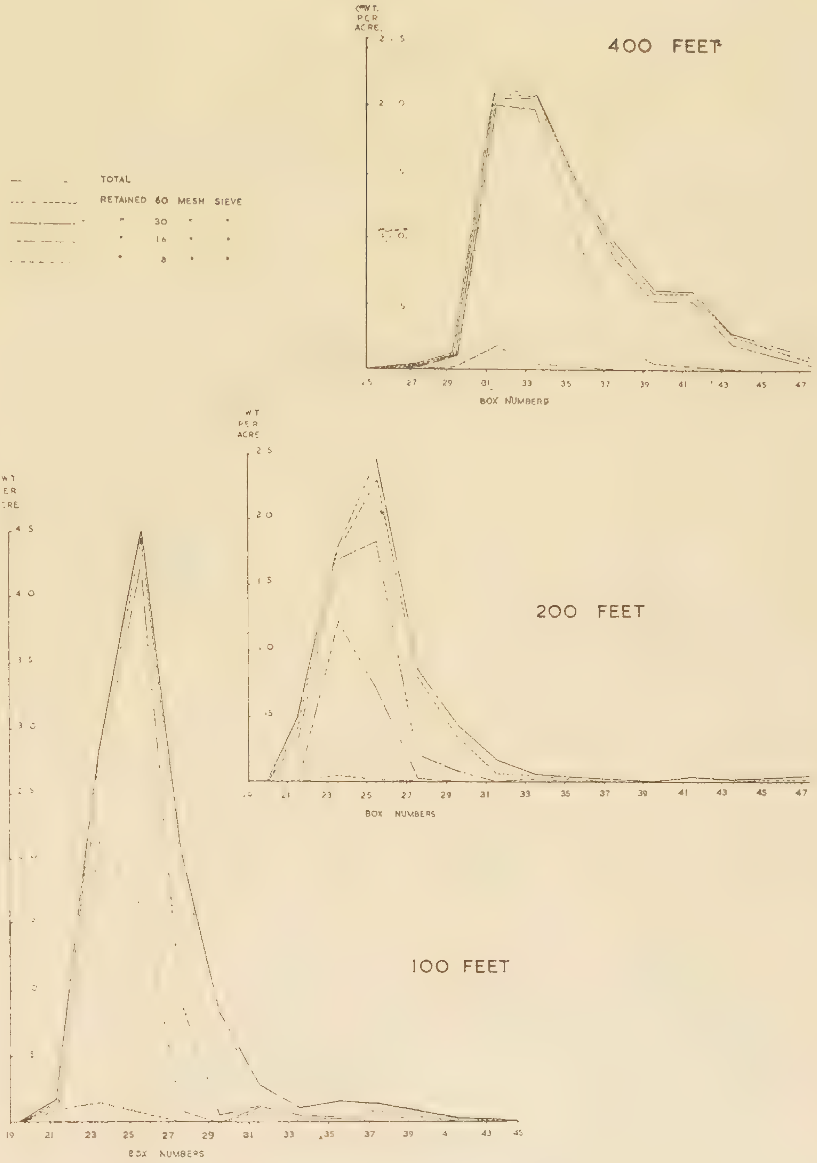


Fig. 7—Cross sections of distribution patterns of aerial mixture from Beaver flying at 100, 200, and 400 ft.

Trial with Dakota, 1955

In cooperation with Messrs James Aviation Ltd. measurements were made of the distribution from a modified DC3 (Dakota) on a flat property near Rukuhia Aerodrome. Again, with a large aircraft only a cross section of the distribution could be measured. The grid comprised two pairs of rows 6 chains apart with kerosene tins as the collecting receptacles. The tins were placed at ½ chain intervals within the rows.

The material used was a roughly granulated superphosphate. Because the material was stored and loaded into the aircraft in bulk, it was difficult to obtain a sample that could be considered truly representative, but the mechanical analysis of the sample which was drawn was:

	Per cent
Retained on:	
8-mesh sieve	34
16-mesh sieve	29
30-mesh sieve	11
60-mesh sieve	12
Passed 60-mesh sieve	13

Runs were made at 300, 500, and 700 ft. in conditions of no wind, and the patterns of spread for these are shown in Fig. 9. Though the general shape of the curves is similar in all, the amount collected from the run at 500 ft. (which was made first) was only about one-third of that from the other heights, though the weather remained constant. This suggests that the rate of delivery from the hopper varied considerably. The difference between flying at 300 and 700 ft. did not have any marked effect on the spread. For the runs at 300 and 700 ft. the peak rate of deposit was 9 cwt. per acre and the average width of row which received 1 cwt. per acre or more was 120 ft. The average width of row receiving ½ cwt. per acre or more was 170 ft. and the average rate of deposition within this area was 3.5 cwt. per acre.

The wind rose later and when it was medium to strong (9 to 10 knots in a direction at right angles to the flight path) two more runs were made, at 300 and 500 ft. respectively. These gave a very low rate of deposit over a very wide swath, but the peak density was less than 1 cwt. per acre and the total amount of material collected from each run was only a seventh of that collected from the runs in the first phase.

If the hopper was discharging at the same rate as at the end of the first phase, it seems that most of this material must have become airborne in the higher wind and drifted right off the target area. However, in view of the large change in deposit rate which occurred during the first phase (between runs 1 and 2), it is not impossible that a further hopper change may have taken place before this second phase.

Fig. 10 shows the graphical representations of these distributions. A just-measurable amount of fertiliser was collected from a width of 270 ft. A further two runs were then made with a much increased hopper opening. The general shape of the distribution curve for these runs was very similar to that of the second-phase runs, with no marked peak and a wide swath of roughly equal rates (see Fig. 11).

For the drop from 500 ft. the wind was 14 knots across the line of flight. The peak density averaged over the four measuring rows was 1.1 cwt. per acre, and a rate of ½ cwt. per acre or more was deposited over a width of 180 ft. For the drop from 300 ft. the wind was 10 knots in the same direction. The peak density was 1.6 cwt. per acre and a rate of ½ cwt. per acre or more was deposited over a width of 200 ft.

The total amounts of fertiliser recovered from each of these drops were similar and were each roughly about a third of the totals recovered from the two satisfactory runs in phase one.

The slightly greater flattening of the peak of the distribution curve for the drop from 500 ft. compared with that from 300 ft. and the consequently wider spread may have been due to the greater height of flying or to the stronger cross-wind then blowing. Though the wind is given as 14 and 10 knots for the two runs respectively, it was gusting up to 20 to 25 knots.

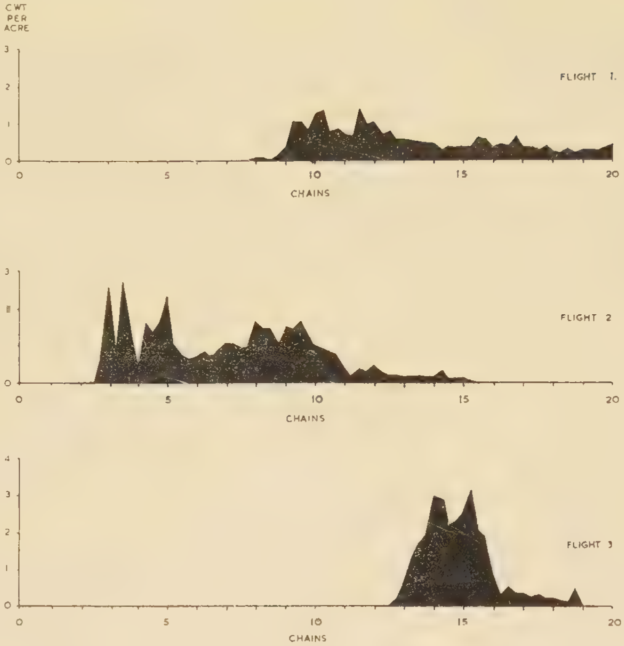


Fig. 8—Distribution patterns from three runs of Bristol Freighter.

Analysis of the results for the particle-size separations showed that most of the material which was fine enough to pass a 60-mesh sieve was lost off the target in all conditions of height and wind. It must be remembered, however, that the sample from the bulk with which comparisons are made may not have been very accurate. There also appeared to be some loss of material which passed a 30-mesh sieve. This was not noticeably greater at the higher wind speeds.

These results indicate that though the total amount of fertiliser received on the target area varied very greatly for the different runs, the mechanical composition of the material remained more or less constant. Thus if the low rate of application under windy conditions resulted because most of the material dropped drifted away from the area, this loss occurred equally in particles of all sizes.

It was observed that on motor cars parked to the leeward side of the target there was a distinct rattle, which suggests that not only the very fine dust was carried away. It was perhaps noteworthy that for the last run the

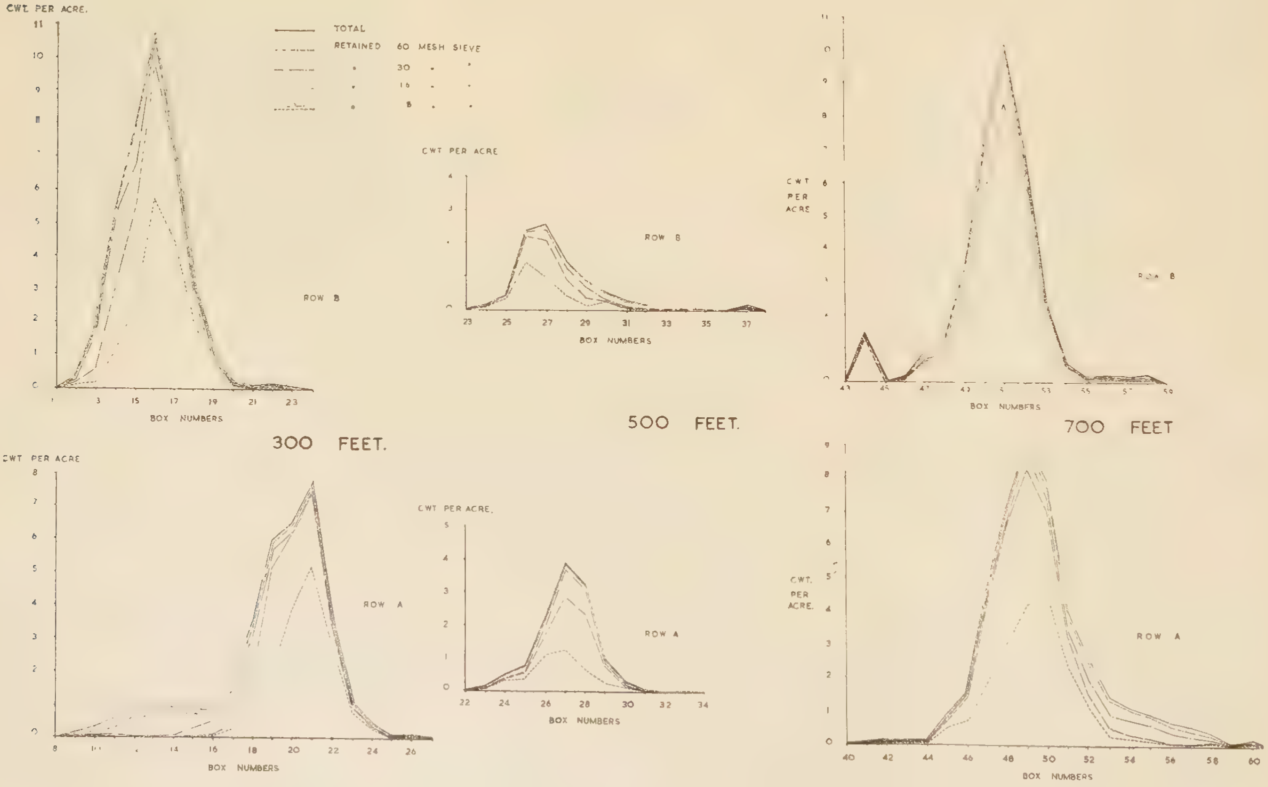


Fig. 9—Distribution patterns for Dakota flying at 300, 500, and 700 ft. in calm conditions.

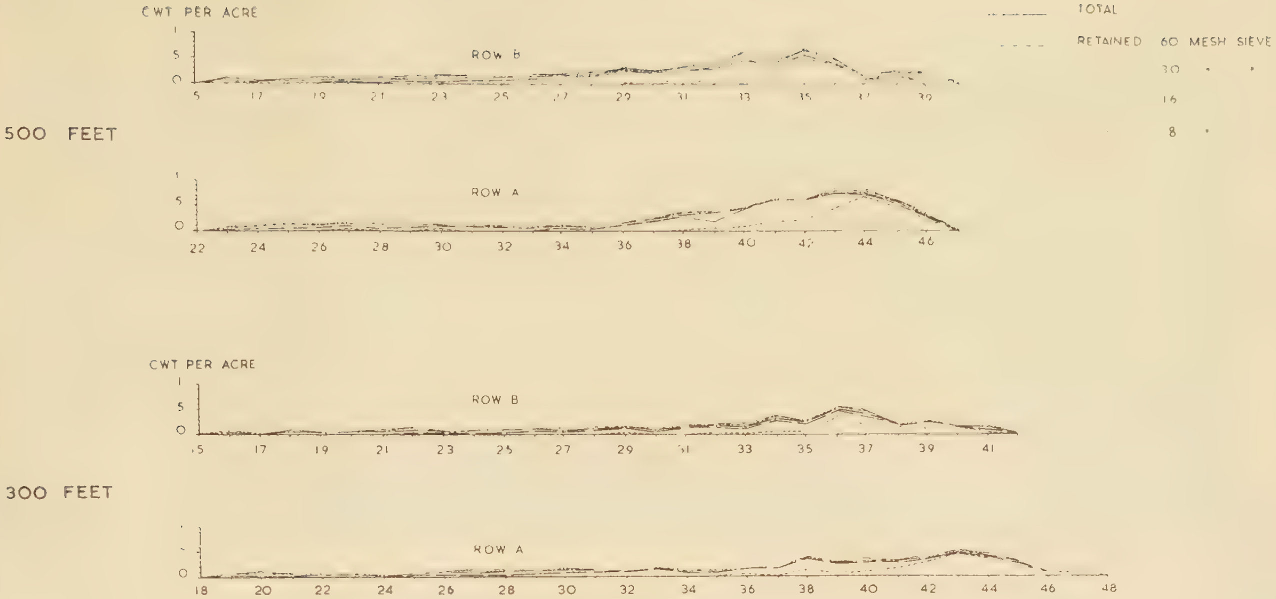


Fig. 10—Distribution patterns for Dakota flying at 300 and 500 ft. in windy conditions.

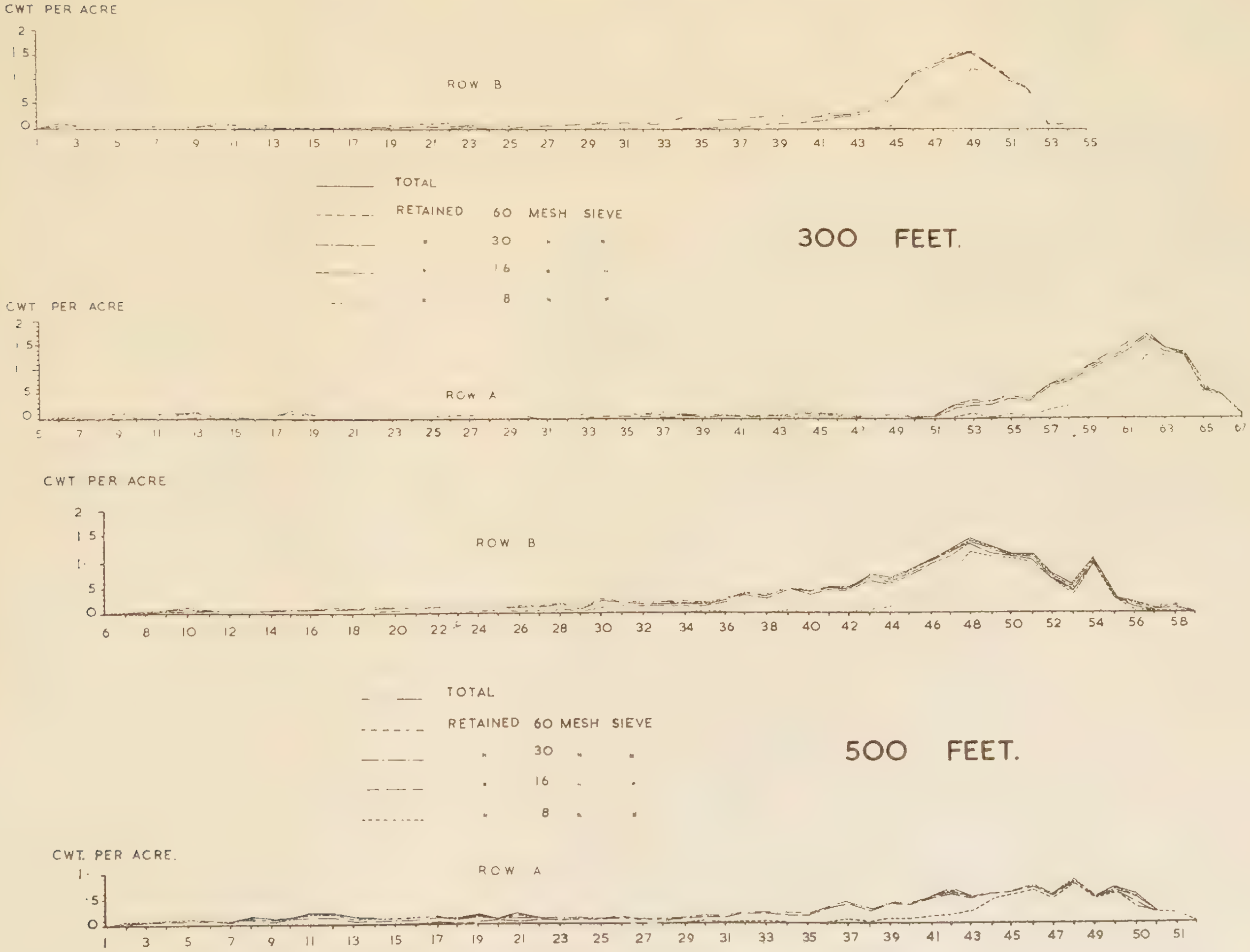
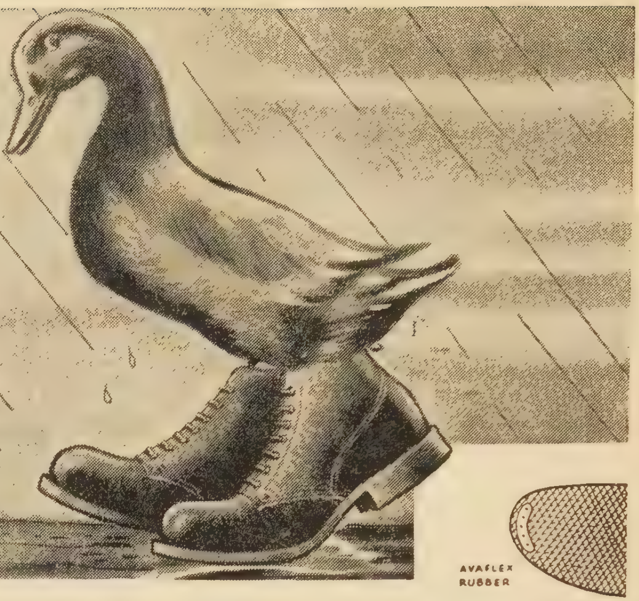
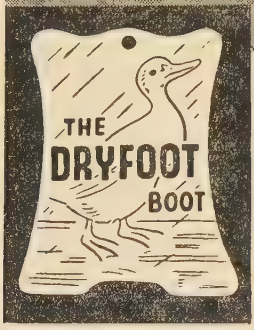


Fig. 11—Distribution patterns at heavier rate for Dakota flying at 300 and 500 ft. in windy conditions.

ALL WEATHER FOOTWEAR FOR FOLK WHO WORK OUTDOORS

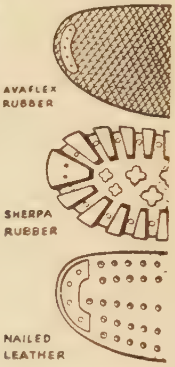




A name tag on working boots is something to look at. This Dryfoot tag, with the duck, guarantees you've bought the toughest working boot made. Dryfoot boots are interlined for water proofing. They're ruggedly made with toughest leathers.

Your choice of Sherpa Commando rubber soles, nailed leather soles and comfortable Avaflex rubber soles. Wherever you buy working boots you'll buy the Dryfoot with the duck on the tag.

Made in N.Z. by Sargood Son & Ewen Ltd. SJ8-1



In High Street, England, they 'Buy New Zealand' through FMC

WHAT'S the best way of selling lambs in Britain? Through FMC. New Zealand farmers who entrust their produce to FMC can be sure of one thing. It will reach their most important customer – Mrs. Brown in High Street, England – in the best possible condition; and so will create the best possible impression. FMC is one of the biggest and most go-ahead firms of meat wholesalers in Britain – and it's a producer-sponsored and controlled body. With over 100 sales and storage depots throughout the country, operating fleets of fast, modern transport vehicles, FMC gives New Zealand lamb producers their most direct link with High Street, England.

Agents for: Producers' Meats Limited; Primary Producers' Co-operative Society (Otago) Limited.

THE FATSTOCK MARKETING CORPORATION LIMITED
AGRICULTURE HOUSE · KNIGHTSBRIDGE · LONDON S.W.1
ENGLAND

aircraft flew in a path which was 1 chain beyond the end of the grid, yet only an unmeasurable trace was collected in the last 14 tins of the grid. This means that there was a distance of 4½ chains between the flight path of the aircraft and the nearest deposit of fertiliser. This was the minimum displacement suffered by even the largest particles under these conditions.

Trial with Beaver and Fletcher, 1955

When the trial with the Dakota was carried out both a de Havilland Beaver and a Fletcher FU 24 were nearby and the opportunity was taken to have them make some runs over the grid that had been set out for the Dakota. The spacing between tins (¼ chain) was rather wide for these smaller aircraft, because their width of spread is only about 1 chain. Comparisons of widths of spread for different heights of flying were consequently not very precise.

Some of the runs of these aircraft were markedly skew to the direction of the grid and hence the diagrams show a spread somewhat wider than the true one. Corrections were made for this in the figures quoted in the table on page 384.

As only a very light breeze was blowing (2 to 3 knots), the runs compare with the runs in the first phase of the Dakota trial.

Beaver

The Beaver made two runs at 100 ft. (the first missed one pair of the target rows of tins) and one run each at 200 and 300 ft. Details are shown in Fig. 12.

Approximately the same amount of material was collected from all rows of the second run at 100 ft. and of the run at 200 ft. Much less was collected from the run at 300 ft. and it is not clear from the graph whether this is due to a loss of fine material (row B suggests this), or to a lower rate of discharge, possibly because the hopper was becoming empty (row A suggests this). There was no clearly defined difference in width of spread due to height of flying. The average width of spread to limits of ½ cwt. per acre was 67 ft.

Fletcher

The Fletcher made one run at each of the heights 100, 200, and 300 ft., and details of these are shown in Fig. 13. It can be seen that very little material was collected from the run at 300 ft. As there was very little wind, it must be presumed that the hopper had a low rate of discharge on this, the last run of the three. Again it is not clear whether a consistently wider spread was obtained from 200 ft. than from 100 ft.

The average width of spread to ½ cwt. per acre limits was 72 ft.

Conclusions from Trials

One of the most obvious conclusions from these trials is that no really satisfactory technique of measurement has yet been achieved. No definite answers can be given on the effect of granulation on fertiliser distribution because of the failure to account for all material dropped, including the fractions of large particle size. A more satisfactory method of collecting fertiliser is badly needed and it is hoped to do some work on measurement technique in the near future.

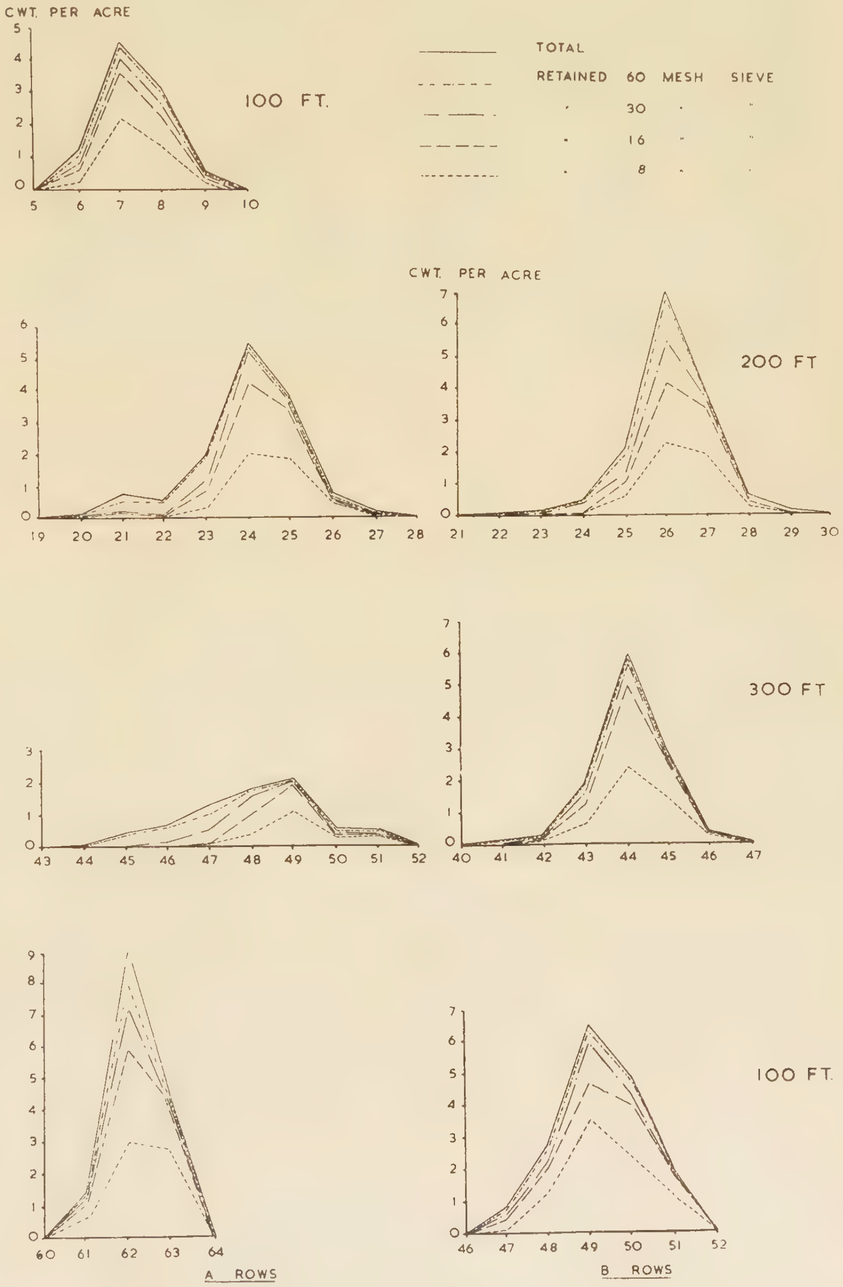


Fig. 12—Distribution from Beaver flying at 100, 200, and 300 ft.

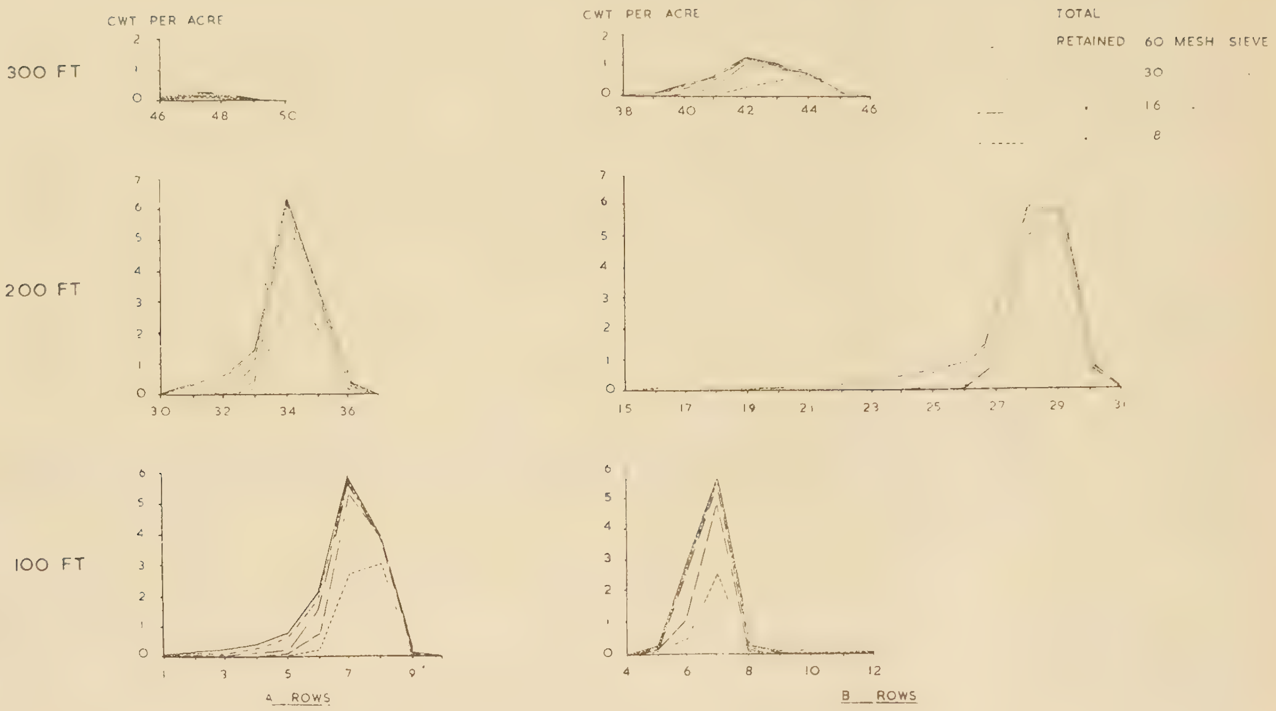


Fig. 13—Distribution from Fletcher flying at 100, 200, and 300 ft.

The differences in pattern of spread between successive runs made by the same aircraft under apparently similar conditions are surprisingly large, and when the weather (especially wind) changes slightly, performances are obviously greatly affected. This fact and the general evidence of the trials show clearly that in practice distribution must be far from even. Where topdressing is to be repeated annually this may not be of much importance in that strips missed one year will probably get something the next. However, where a material is likely to be applied once only and where insecticides or trace elements are mixed with fertilisers the need for even spread could be exceedingly important.

It is not possible on the basis of these trials to make assessments of the relative efficiencies of different aircraft, or even in most cases of different forms of fertilisers, because each has been used under somewhat different conditions. This is unavoidable owing to wind variation. The most that can be said is that in all trials so far best results in width and density of spread came from the trial with the Bristol Freighter which used temporarily granulated superphosphate in a light crosswind.

Results in aerial topdressing trials are set out below, but the reservations already mentioned must be taken into account when comparisons are made.

References

Jean G. Miller, "Measurement of the Distribution of Granular Superphosphate from Aeroplanes", "New Zealand Journal of Science and Technology", vol. 33A, No. 2, pp. 17-27.

P. B. Lynch, "Measuring Efficiency of Topdressing by Light Aircraft", "The New Zealand Journal of Agriculture", vol. 82, pp. 315-320.

Jean G. Miller, "The Distribution of Fertiliser from a Beaver Aircraft", "New Zealand Journal of Science and Technology", vol. 38A, No. 4, pp. 383-396.

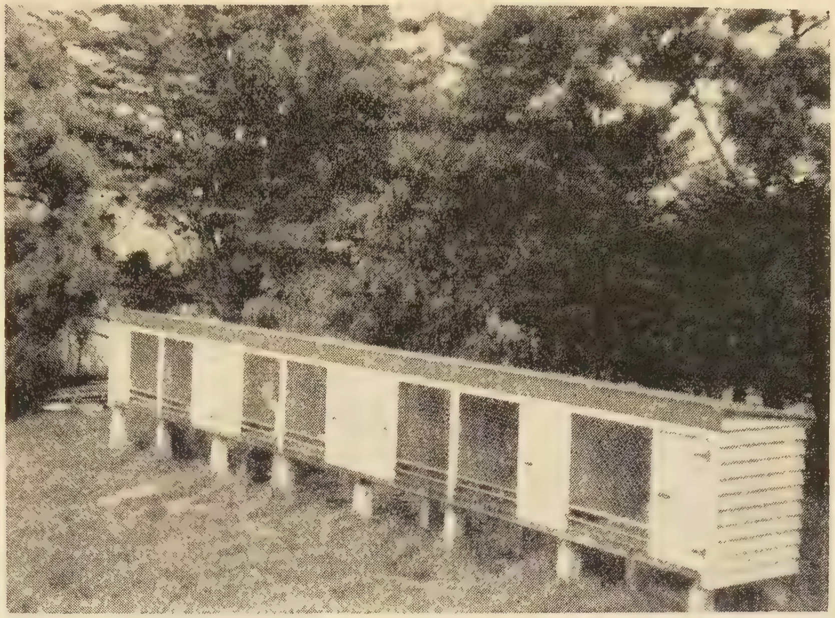
MEASUREMENT OF SPREAD ON GROUND IN AERIAL TOPDRESSING TRIALS

Aircraft	Material	Wind speed	Wind direction	Height of flight ft.	Peak density cwt.	Width to ½ cwt.	Width to ¼ cwt.	Mean within ½ cwt. limits cwt.
Avenger	Hillside super.	7 m.p.h.	Variable	400	7.4	Not available owing to overlapping of runs		
Tiger Moth	Serpentine super.	8-20 m.p.h.	Cross	70	9.2	No regular spread		2.2
	Superphosphate	8-20 m.p.h.	Cross	70	6.7	No regular spread		1.6
	English granulated super.	8-20 m.p.h.	Cross	70	5.5	No regular spread		1.9
Beaver	Aerial No. 3	7-9 knots	Against flight	200	5.1	54 ft.	59 ft.	2.8
	Aerial No. 1 (fine)	7-9 knots	Against flight	200	9.0	72 ft.	89 ft.	3.8
	"Super. compound"	7-9 knots	Against flight	200	2.5	90 ft. (irregular)	105 ft.	1.7
	Aerial No. 1	7-9 knots	Against flight	100	4.5	80 ft.	100 ft.	2.4
	Aerial No. 1			200	2.4	75 ft.	80 ft.	1.4
	Aerial No. 1			400	2.2	115 ft.	135 ft.	1.2
Bristol	Temp. granulated super.	18-20 knots	Cross	400	1.4	5 ch.	11 ch.	0.9
	Temp. granulated super.	18-20 knots	Cross	400	2.7	8 ch.	9½ ch.	1.2
	Temp. granulated super.	5-10 knots	Cross	400	3.1	3½ ch.	5 ch.	1.8
Dakota	Granulated super.	Calm		300 and 700	9.0	170 ft.	190 ft.	3.5
	Granulated super.	10 knots	Cross	300	1.6	140 ft.	240 ft.	1.1
	Granulated super.	14 knots	Cross	500	1.1	180 ft.	285 ft.	0.8
Beaver	Granulated super.	Calm		200	6.2	67 ft.	94 ft.	2.8
Fletcher	Granulated super.	Calm		200	6.2	72 ft.	107 ft.	2.6

Good Dog Housing : A Step in Hydatid Control

By R. G. GILL,
Livestock Instructor,
Department of Agriculture,
Levin

EFFORTS now being made throughout New Zealand to tackle the problem of hydatids have led to recognition of the need for much better control and treatment of working dogs. The result has been wide interest in improved dog housing. The type of construction used in two good, similar houses in the Horowhenua district, where many new types are being used, is illustrated. The aim is to provide freedom of movement and comfort for the dogs at all times in escape-proof and weatherproof accommodation.



The dog housing provided by Mr K. R. Moody was erected by a builder at moderate cost.

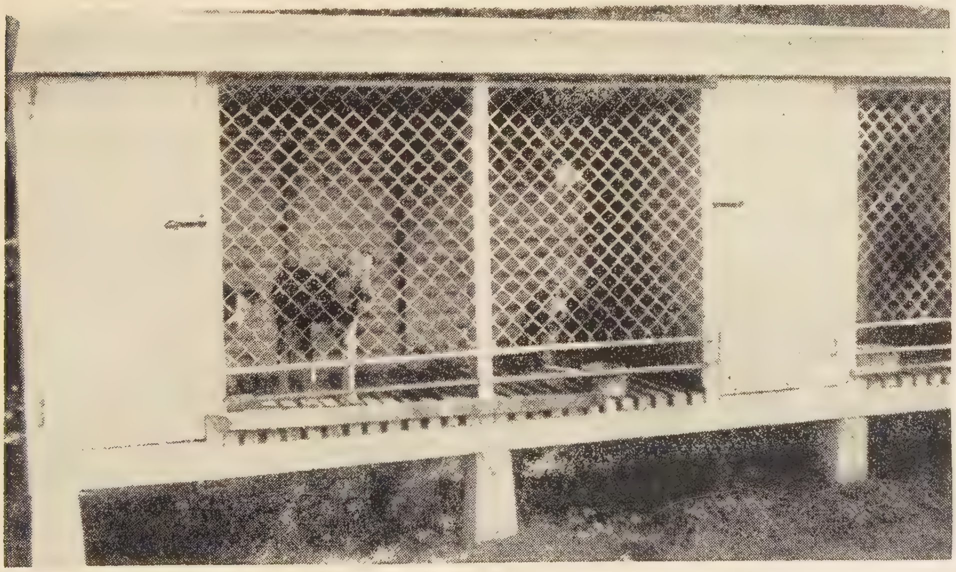
DOG owners now realise that a dog can remain free of the tapeworms responsible for hydatids and other diseases only if he is under full control at all times. Dogs will slip their collars very easily and many dog owners find their dogs off the chain after they had been tied up.

Healthy and well fed dogs will generally work better provided they are properly housed. Mr K. R. Moody of Koputaroa, who is a fat-sheep farmer and dealer and a member of the Levin and District Hydatid Committee, has provided the excellent housing shown in the illustration above. He has stated that he wants only fit and healthy dogs which must be ready to work at all times. Since the photo was taken the surrounding grass has been cleared from the ground about and under the house and the ground treated with waste oil.

Another set of kennels is on Mr H. G. Gundersen's property near Otaki. Using builder's reject timber Mr Gundersen completed his kennels in 1 week at low cost.

The kennels are similar in design and have been provided with a removable bottom bar on the exercise pens to make cleaning easier and more thorough.

Both these dog owners have no trouble with their dogs. They are always willing to be locked up and the owners know that when their dogs are shut up they have no chance to get at dead carcasses or to worry neighbours' stock and can be left for short periods with the owners confident that the dogs are safe. With good feeding and housing and with regular dosing with arecoline tablets these dogs are free from hydatids.



← Mr H. G. Gundersen's dog house, which faces north in front of a lawsoniana hedge, is 25 ft. long, 4 ft. 3 in. wide, 4 ft. 9 in. high at the front, and 4 ft. 4 in. high at the back. It is suitable for five dogs. The back wall, roof, and sides are of corrugated iron. Each pen has a door 19½ in. wide and a heavy-gauge, small-mesh netting front 3 ft. wide. Divisions between pens are of the same netting, but could be timber. Malayan hardwood battens are used for pen floors, with inch gaps between battens. The ground beneath the floor is treated with waste oil, and material which collects is raked out and burnt. The bottom 1 in. pipe along the front is removable to facilitate cleaning. The building is on twelve 2 ft. 6 in. house piles.

Checking Efficiency of Milking Machines

By M. J. McFETRIDGE,
Supervisor of Farm Dairy Instruction, Department of Agriculture, Hamilton

MARKED improvement in the general efficiency of milking machines checked in 1958 under the Dairy Division's free service, compared with the results of the trial in 1952 that led to the establishment of the system on a Dominion-wide basis some 6 years ago, indicates the value of regular checks of milking plant. Today 41 trained officers carry out the service, which is available to any dairy farmer.

CHECKING is done during the off-season. Two reasons for this are that farmers should have their machines up to requirements at the beginning of the new season to obtain maximum benefit and that Farm Dairy Instructors are required to carry out their inspection and instructional duties throughout the producing season without interruption. Checking is done from 1 April to 31 July in the North Island and to 31 August in the South Island.

Various Faults

The number of machines checked during 1958 totalled 1,381 and a summary of the results and the percentages of important findings is set out in the next column.

These figures indicate an improvement in the general efficiency of machines checked as compared with the trial carried out in 1952, when 20.6 per cent were found to be efficient as against 41.2 per cent in 1958. This can be accounted for by the fact that many milking machines are now checked every winter, or every alternate winter, which indicates that those farmers who have availed themselves of the service consider the check well worth while.

Faults	Per cent
Machines efficient, requiring no renovation	41.2
Air reserve	
Machines with no air reserve	4.1
Machines with air reserve under standard	54.6
Vacuum pumps	
Under capacity by inefficiency from wear and tear	14.0
Under capacity for type or size of machine	15.6
Under capacity by insufficient speed	10.9
Vacuum gauges	
Inaccurate by under 1 in.	11.4
Inaccurate from 1 in. to 3 in.	27.7
Relief valves	
Obsolete type or unsatisfactory in condition	29.5
Air leaks	
Machines showing air leaks	47.9
Pulsators	
At incorrect or irregular ratios	22.6
Leaking	4.5
Releaser pulsator incorrectly set	9.0
Releasers	
Functioning incorrectly	20.9
Machine parts	
Unsatisfactory piping	.8
Unsatisfactory rubber	33.6
Unsatisfactory parts	6.8

Major Fault

Insufficient reserve air is found to be the major fault. There are several reasons for low reserve—air leaks, faulty relief valves, poor seating of releaser flaps, and vacuum pumps either too small or inefficient.

Small air leaks at unions, pulsators, and perished rubbers can account for considerable air displacement; inefficient relief valves in many cases give a farmer a wrong impression of the efficiency of his machine. Poor seating of releaser flaps can seriously upset the efficiency of the machine in several ways, and while some vacuum pumps may be inefficient through wear and tear, others may be efficient but too small to displace the air required.

The instruments used and calculations made by checking officers can pinpoint these faults, and if a farmer avails himself of the service and then arranges for a competent serviceman of his own choice to make the recommended adjustments, he can at least be assured that his milking machine is functioning as efficiently as possible and that he has taken all precautions against loss of production through poor machine efficiency.

Farmers desiring this service are requested to make early application to the Farm Dairy Instructor for their district so that the work can be completed during the off-season. Late applications may have to be carried over if other work requires the attention of checking officers.

Dairy Produce Graded for Export

THE following figures showing quantities of dairy produce graded for export during December 1958 and for the 5 months ended 31 December 1958 with comparative figures for the same month and the 5 months of 1957 have been compiled by the Dairy Division of the Department of Agriculture from figures supplied by divisional officers at the various grading ports:

BUTTER

Period	Creamery (tons)	Whey (tons)	Total (tons)	Percentage inc. or dec.
December 1958	26,015	372	26,387	—
December 1957	25,593	399	25,992	—
Increase or decrease	+422	—27	+395	+1.520
5 months ended 31/12/58	107,816	1,480	109,296	—
5 months ended 31/12/57	105,499	1,587	107,086	—
Increase or decrease	+2,317	—107	+2,210	+2.064

Butter in store at 31 December 1958 was 30,984 tons

CHEESE

Period	White (tons)	Coloured (tons)	Total (tons)	Percentage inc. or dec.
December 1958	9,865	2,621	12,486	—
December 1957	11,839	2,029	13,868	—
Increase or decrease	—1,974	+592	—1,382	—9.965
5 months ended 31/12/58	34,049	8,270	42,319	—
5 months ended 31/12/57	41,566	7,021	48,587	—
Increase or decrease	—7,517	+1,249	—6,268	—12.901

Cheese in store at 31 December 1958 was 15,776 tons

If these figures are converted into butterfat equivalent, there is a decrease of 0.476 per cent in butterfat graded for the 5 months as compared with the preceding season. The above figures refer only to butter and cheese graded for export, and owing to diversions which may take place they are not necessarily a true indication of production trends.

Winter Show Dates

12, 13, 14, 15, and 16 May—Southland Winter Show at Invercargill.

*26, 27, 28, 29, 30 May, 1 and 2 June—Waikato Winter Show at Hamilton.

*28, 29, and 30 May, 1 and 2 June—Otago A. and P. at Dunedin.

*10, 11, 12, and 13 June—Taranaki A. and P. at New Plymouth.

11, 12, and 13 June—Te Kuiti and District Winter Show at Te Kuiti.

16, 17, 18, 19, and 20 June—Whangarei A. and P. Winter Exhibition at Whangarei.

26, 27, 28, and 29 August—Whakatane A. and P. at Whakatane.

* The Department of Agriculture exhibit will be staged at this show.

Wool Sales

The dates and venues of wool sales until the end of May are:

23 April: Dunedin.
27 and 29 April: Invercargill.
11 and 13 May: Auckland.
18 May: Napier.
21 May: Wanganui.
25 May: Wellington.

THE HOME GARDEN IN MAY

[*Sparrow*

Tidiness can make the vegetable garden an attractive place even on a sunless day in May.

By A. G. KENNELLY,
Horticultural Instructor, Department of Agriculture, Dunedin

THERE is usually digging and much tidying to be done in the home garden in May, as the residues of half-hardy crops such as tomatoes, beans, marrows, pumpkins, and potatoes have to be cleared away and the land they occupied dug over. Nothing is to be gained in most gardens by planting or sowing any but the hardiest vegetables, as usually the weather can be expected to become progressively less favourable for growth until the shortest day.

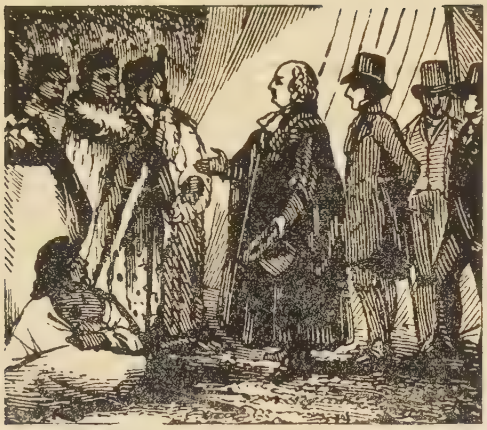
SOME sowing and planting may be done in May if the soil is well drained and cultivated. If firming is necessary in preparation of the soil, it should be confined to the seed or plant rows and done only in moderation to medium and heavy soils. A simple method of testing soil condition for sowing is to walk on it. If it sticks to the soles of the boots, it is too wet.

Comparatively little growth can be expected in most gardens in the next 2 months and the home gardener must decide whether anything is to be gained by sowing or planting any but the hardiest subjects such as broad beans or spinach now. It is not advisable to plant or sow even hardy subjects in cold situations where the soil is heavy and poorly drained. Temperature and other aspects of the weather are not usually so favourable that the plants should be subjected to the additional hazard of a cold, wet soil if this can be avoided.

Cabbages and cauliflowers can still be set out in most gardens where the soil is well drained as advised in last month's "Journal" and, where conditions are not likely to be too severe, lettuce as well. Broad beans and spinach can be sown and in some districts peas, but unless the garden is in a very favourable situation and the weather is very good, it is best to defer sowing seeds of such plants as carrots, onions, turnips, and even radish until July, August, or September according to conditions.

The top growth of asparagus should be cut down as soon as it begins to turn yellow and digging of kumara and potato crops should be completed without delay. Potatoes and other root crops in store should be sorted over to remove those with rots.

Vacant ground can be sown with a green crop and, if necessary, limed and attention given to the compost



"Behold — I bring you glad tidings of great joy"

The Reverend Samuel Marsden, on Christmas Day 1814, delivered this sermon to the assembled native population at the new Bay of Islands settlement—whilst this sermon was more edifying than effective—Christianity and cannibalism had met, and a new and bright light shone on an ancient land.

Geigy on that day was 56 years old!

Geigy, during World War 2 years gave the world D.D.T., possibly one of the greatest contributions to chemistry and the well-being of mankind the world has ever known.

Today, 15 years later, Geigy DIAZINON, another wonderful contribution, is known by farmers throughout all countries of the world as being the most modern chemical available for the control of a wide variety of Veterinary, Horticultural and Household pests.

THE Geigy GROUP OF COMPANIES MANUFACTURE AND SELL—

Dyestuffs, Pigmentary Colours, Synthetic Tans, Auxiliary Products, Fine Chemicals, Pharmaceuticals, Insecticides, Plasticisers, Dispersers.

Sole Distributors of DIAZINON throughout New Zealand
AGRICULTURAL SERVICES (N.Z.) LIMITED, a virile subsidiary of Ivon Watkins Limited, New Plymouth.

G.3.

Ground not to be used for some time should be dug over and sown with a cover crop.

[*Sparrow*

heap and to the burning of diseased or woody rubbish. Rhubarb beds should be weeded and the seed stalks removed. Rhubarb plants with mottled or streaky leaves, indicating virus disease, should be dug out and burnt.

If the garden is tidy, it can be quite an attractive place in winter. The cleaning out of untidy areas where unwanted grass and weeds are growing and the removal of such trash as old boxes, pieces of wood, old useless posts, stakes, bricks, and stones improve the appearance of a garden and are important in pest and disease control. Untidy corners provide ideal breeding grounds for such garden pests as earwigs, slugs, snails, slaters, cutworms, millepedes, and wireworms.

Weeds, whether among crops or round the edges of the garden, should be destroyed, as they may be the means by which pests such as thrips, mites, and aphids, which are often considered more serious than weeds, are carried over from season to season. They may also serve as host plants for virus and fungous diseases from which insects infect the next season's crops.

All weeds, long, matted grass, and untidy corners should therefore be cleared away; soft rubbish can be composted and unwanted, woody material should be burnt. Refuse of some diseased crops can safely be put on the compost heap. However, if there is any doubt about the longevity or resistance of the spores of the diseases to such destructive agencies as occur in compost heaps, the refuse should be burnt as should most garden refuse that is infested with active insect pests. The ash of such material is sometimes a fairly good source of potash and should be gathered and put under cover before rain leaches the nutrients from it. It may be useful as a supplementary fertiliser, if its potash content is high, for such crops as onions, tomatoes, and certain taprooted vegetables.

Application of Ashes

Wood ash or the ash from garden refuse should be used with discretion, as heavy dressings may have an adverse effect on the tilth or structure of some soils. Its effect is usually most damaging on soils that contain insufficient organic matter. Moderate dressings are therefore preferred.

Cover Crops

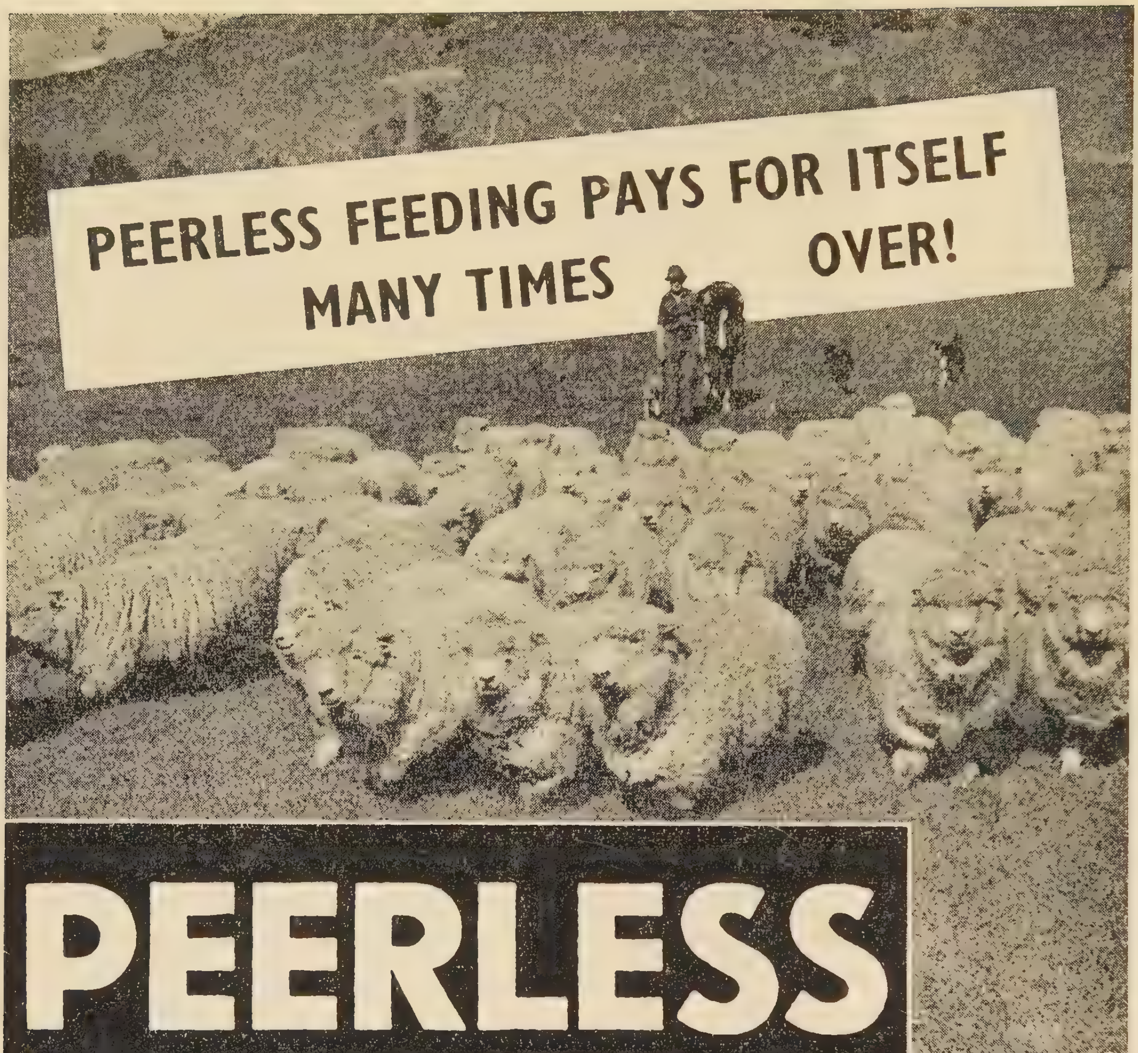
Whenever practicable ground should be sown with a cover crop for digging in to increase the organic material in the soil. Cover crops also take up soluble plant foods and so prevent their loss by leaching. Choice of crop depends largely on the district or the period the ground is likely to be left before it is required for another vegetable crop.

Barley and oats are quick maturing and usually grow quite well even in the colder southern districts if sown now. Mustard is even quicker where conditions are warm, and in favourable conditions it usually produces a heavier crop, but it usually fails to grow well where conditions are cold. Lupins make the best cover crop for digging in on most soils, as they are a legume and are a good source of nitrogen when the nodules on their roots break down. They are subject to frost damage if sown very early for overwintering in districts subject to heavy frosts, and if sown late in the colder districts, they usually fail to make adequate growth before they are required for digging in.

The seedbed for a cover crop should be firm and reasonably moist and for best results the seed should be gently raked in. Thick sowing is desirable with most green crops, as a thick stand of plants is required to increase the total amount of dry matter to be dug in, especially as the period between sowing and digging ir is usually limited.

Broad Beans

May is usually the preferred month for sowing broad beans, as they are very hardy and do well in cool conditions. As broad beans are easy to grow and most varieties can be relied on to produce a good crop with very



PEERLESS
SHEEP NUTS

Containing DE-HY LUCERNE and LINSEED MEAL

Supplementary feeding is no longer an emergency measure . . . it's essential if you want maximum production and greater profits. Irrespective of natural feed conditions thousands of farmers, season after season have proved the wisdom and value of feeding PEERLESS SHEEP NUTS. You can do better this season and increase your carrying capacity by feeding PEERLESS SHEEP NUTS!

Prevent Sleepy Sickness! *Sleepy Sickness is a nutritional disease and can be prevented by properly balanced nutrition. Feed PEERLESS SHEEP NUTS, the most reliable scientifically balanced feed containing DE-HY Lucerne and Linseed Meal for extra nutrition at NO EXTRA COST!*

PEERLESS SHEEP NUTS are easily fed out and are extremely economical. One bag will feed 400 sheep at a cost of little more than a penny per head daily.

AVAILABLE FROM MERCHANTS, STOCK & STATION AGENTS, ETC.

P.16

Write in for free brochure and details of feeding trials.

Manufactured by
D. H. BROWN & SON LTD.
C.P.O. Box 242, Christchurch

There's more Profit in sheep when you feed "PEERLESS"

[Green and Hahn

May is the preferred month in most districts for sowing broad beans.

little attention, they deserve a place in the garden of every home where their flavour is appreciated. The earlier sowings usually mature at a time when fresh vegetables are scarce and lacking in variety in most gardens.

Broad beans do not require special soil, but it is not advisable to sow them in wet, sticky soil or light soil that tends to dry out. They do well in fairly heavy, moist, well drained soils that have been well cultivated and into which has been worked, if the soil lacks organic matter, a moderate amount of material such as compost or well rotted farmyard manure.

The principal plant nutrient required on most soils is phosphoric acid, which can be supplied by superphosphate or by bone manure, though on soils such as those in many home gardens that have been cultivated for many years without a balanced manurial programme being followed, a complete fertiliser containing nitrogen, phosphorus, and potash is likely to give best results. Apart from their nutrient value phosphates are said to have a stimulating effect on the nitrogen-fixing bacteria on the roots of broad beans.

Broad beans require only a small amount of nitrogen. A mixture of 1 part of sulphate of ammonia, 4 parts of superphosphate, and 1 part of sulphate or muriate of potash, all by weight, or alternatively 3 parts of blood and bone, 2 parts of superphosphate, and 1 part of sulphate or muriate of potash worked in at 2 to 3 oz to the square yard, according to the fertility of the soil, will give good results on most soils that have been well dressed with balanced fertilisers for previous crops.

Though broad beans are tolerant of a fairly wide acid-alkaline range (pH), they will not thrive in excessively acid conditions. In districts with moderate to heavy rainfall growth in most soils not recently limed will be improved by applying carbonate of lime at about 2 to 4 oz to the square yard. It is best worked in some time before sowing.

Apart from weed control, beans should require little attention when young, but it is usually advisable in winter or early spring when the weather is boisterous to draw a little soil against the stems of autumn-sown plants to support them. Tall growing varieties can be stopped when they are about 30 to 36 in. high by pinching out the tops. This encourages the plants to develop sturdy growth and is often sufficient to check an attack of black aphis in its early stages, particularly if the aphids' natural enemies, such as lacewing flies, ladybirds, and their larvae, are numerous.

In many gardens where tall varieties are grown it is advisable to support the plants as they develop or as they become heavy with pods. One or more strings run along the sides of rows and tied to stakes at intervals or 5 to 6 ft will save the plants from being blown over.

Sowing

Beans sown early in autumn do not necessarily yield pods earlier than those sown in late autumn or early winter, for though the plants may make good growth in late autumn and early winter, they are likely, particularly where winters are fairly severe, to be damaged and checked by disease or by boisterous weather. The earliest flowers often fail to set because they are produced at a time of unfavourable soil conditions and sudden extreme temperature changes, but if spring sowing is necessary it should not be delayed too long, as the crop may be reduced if it matures in the hot, dry conditions of summer.

In deep, well drained soil broad beans are best set 2 to 3 in. deep, preferably with a trowel, and 4 to 6 in. apart or in the bottom of a drill about 3 in. deep. Seed may be planted in double rows 10 to 12 in. apart, with not less than 26 in. between each double row. Single rows are sometimes preferred; they should be 15 to 18 in. apart. Germination is usually good, but in the home garden a few extra seeds can be sown at the ends of rows and seedlings later transplanted to fill gaps; young plants should be transplanted as early as

The Big Jobs go to Modernite

ONLY PIPE WITH UNCONDITIONAL GUARANTEE

All over New Zealand, the big contractors are specifying Modernite Polythene Pipe. They know they can rely on it. It is guaranteed . . . unconditionally. It won't wear out. Weather and soil conditions won't crack it. Recommended pressures won't burst it. It will not rot, rust or corrode. Made by Modern Plastics, the *first* Company to manufacture polythene pipe in New Zealand.

OVER 37 MILLION FEET SOLD

More than 7,100 miles of Modernite Polythene Pipe have been sold. Every single foot guaranteed unconditionally under all conditions of normal usage against defects and unsatisfactory service.

GOVERNMENT CONTRACT

For the next two years, Modernite Polythene pipe is to be supplied under contract to Government Departments. *This speaks for itself.*

ENFIELD SCHEME—46 MILES

Mr. Wise, Consulting Engineer to the Waitaki County Council writes: "We have no hesitation in saying that the Modernite Pipe used on the Enfield Scheme has given every satisfaction and was one of the major factors contributing to the low cost of this scheme."

90 consumers are supplied with water on this scheme and forty-six miles of Modernite Polythene Pipe in various sizes were used.

NELSON FARM—3 MILES

Mr. Boyes, General Manager of Transport Nelson and Highways Construction Ltd. had three miles of Modernite Pipe installed on the farm belonging to his company.

He writes: "The management is completely satisfied that Modernite Polythene Pipe is doing a first class job—everything that could have been hoped for."

HAMILTON SUBDIVISION—7000 ft.

The consulting engineer on the Queenswood subdivision near Hamilton specified special pressure requirements for the polythene pipe to be used. Many firms were approached, but A. S. Paterson & Co. Ltd. Master Distributors of Modernite, were the only firm prepared to meet these requirements.

Seven thousand feet of Modernite pipe were used to service 126 building sections.

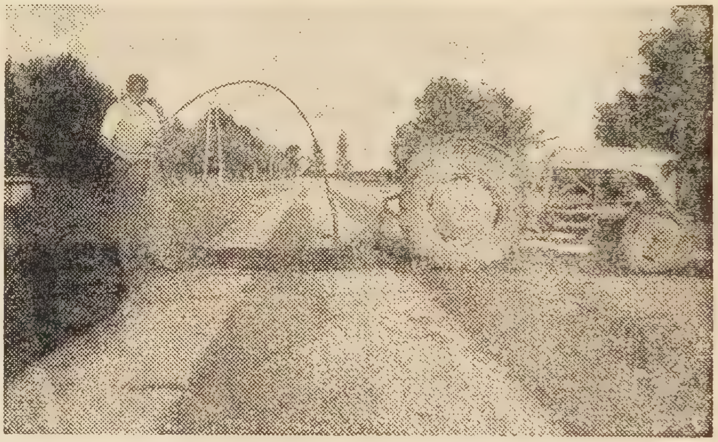
SHOTGUN BARREL FINISH SPEEDS WATER FLOW

Modernite delivers more water per hour because of its mirror-smooth *inside* finish. This 'shotgun barrel finish' cuts the friction loss caused by roughness and irregularities found in other piping.

Modernite is smooth where it counts most . . . on the inside.

8 SIZES—TWO WEIGHTS

Modernite pipe is available in light and heavy grades and in diameters from ½" to 3". A wide range of rapid-fixing, non-rust compression fittings is also available. Look for the two red stripes. Only Modernite has them, only Modernite is unconditionally guaranteed.



Using a sub-soiler (as illustrated) or mole plough, Modernite Polythene Pipe can be laid with great speed. Permanent, leakproof connections can be made in under two minutes, and because it expands with freezing water it can be installed above or below ground in *any* part of New Zealand.

Available from Stock and Station Agents, Dairy Factories, Pipe Specialists, Farm Machinery & Equipment Suppliers, Hardware and Plumbing Merchants.

Master Distributors: A. S. PATERSON & CO. LTD.
Auckland, Wellington, Christchurch, Dunedin,
Blenheim, Nelson, Timaru, Amberley.

CUT OUT AND POST TODAY

Modern Plastics (N.Z.) Ltd.,
Box 351, Lower Hutt.

Please send me free booklet giving full technical details and installation instructions for Modernite Polythene Pipe.

NAME ....

ADDRESS ....

....

7.8

Stored Crops

ONIONS

Onion crops that have been picked over to eliminate immature, soft, and thick-necked bulbs keep well if they have been well ripened and properly cured before being stored. They store best in dry, cool conditions with a good circulation of air.

The best storage temperature is 32 to 36 degrees F. They tolerate slight freezing, but not alternate thawing and freezing. There is little danger of onions freezing in store unless the air temperature goes below 28 degrees F. (4 degrees below freezing) and remains there for a considerable period. As with most other vegetables in store, keeping quality is greatly affected by the amount of moisture in the air (relative humidity).

Sprouting of stored onions is little influenced by humidity, but is increased as temperature rises. Growth of roots of stored onions, however, is largely prevented by low humidity (60 to 65 per cent), which also usually checks the spread of rots, though it causes more shrivelling and softening. Respiration or breathing is lowest, too, at low temperatures, so that losses of carbohydrates (sugars and starches) are less.

Some loss due to shrinkage, rotting, sprouting, or rooting is inevitable in the conditions under which most onions are stored. Shrinkage is usually due mainly to loss of water, sugars, and other products.

Most of the best long-keeping varieties of onions cure and seal up well at the neck and are hard and firm with thick outer scales. They have the longest rest period and do not usually sprout for several months, even if stored in conditions favouring growth. With them the young leaves and the localised region of active cell division from which permanent tissue is derived are totally enclosed by the surrounding scales, which tend to retard the intake of oxygen and so prevent growth. Growth finally results largely because in time the bulb scales become more permeable and enough oxygen gets in to allow growth to start.

* * *

PUMPKINS, SQUASH, AND MARROWS

Pumpkins and squash keep well if they are first cured and then stored at a suitable temperature and humidity. After harvesting, the fruit should be ripened or cured to harden the shell. Fruit should be handled carefully during harvesting and storage, as if it is bruised, it decays more rapidly than if uninjured. Fruit is best cut from the vine with a portion of the stem attached, because skin breaks of any kind are usually followed by decay. If the stem is broken off, it usually leaves a large scar, which rot organisms may enter.

Ripening or curing can be done in the field when conditions are dry and warm, but as such conditions rarely prevail in May, the fruits are best placed in dry, warm storage. Cold storage of pumpkins and squash is unsuitable because of the high humidity that usually prevails.

Authorities differ a little on storage temperatures, but most agree that pumpkins and squash keep best at relatively high storage temperatures. Generally temperatures of 40 to 42 (even up 50) degrees F. with relative humidities of 50 to 70 per cent seem likely to give the best results. Weight loss and shrinkage are greatest at the higher temperatures; more rots are likely to occur at the lower.

Unlike pumpkins or winter squash, marrows should be harvested before the fruits are of a full edible size; that is, before the rind or skin begins to harden. Usually the condition can be judged by thumbnail pressure. If the rind is hard or resistant to thumbnail pressure, the marrow has passed its best.

* * *

TAPROOTED CROPS

In New Zealand lifting and storing of taprooted crops, such as beetroot, carrots, parsnips, swedes, and turnips, are usually unnecessary. However, storage out of the ground may be desirable where through lack of space or foresight the same type of crop has been grown in the same ground for two or more seasons and diseases which tend to produce root rots have increased greatly. Lifting and storing may also be necessary where the soil is heavy and tends to be sticky and poorly drained, or where the crops are grown in a place difficult of access to the housewife in winter. Parsnips and swedes are usually thought to be of better flavour and texture if subjected to moderately heavy frost, but a temperature slightly above freezing is the effective factor. Starch changes to sugar more quickly at from 32 to 34 degrees F. Some varieties of beetroot are susceptible to damage from severe frost.

Because of lack of space, or difficulty in providing good storage conditions, long storage of root crops should be avoided as far as possible. Usually if roots have to be dug, enough can be lifted to provide supplies for 2 to 3 weeks. They can then be stored in a cool situation where there is enough moisture to prevent shrinkage. If longer storage is necessary, roots may be stored in a clean, cool, ventilated situation in sand that is slightly damp. A temperature near to freezing (32 degrees F.) or a little higher, if humidity is high, is most satisfactory.

If home-grown supplies are inadequate for winter or early spring, a good policy sometimes is to buy taprooted vegetables in quantity, such as by the sugar bag or small sack, during late autumn or early winter, when good market supplies usually depress prices. If such roots are replanted in rows or beds in well drained soil in an accessible situation, they may be planted closely and usually keep fresh throughout winter and spring as they re-establish. They will be available until early spring, when they begin to send up seed stalks, which, if allowed to develop, spoil them for culinary use.

---

possible. Seed varies in size, but a little less than a quart of seed will sow about 50 ft of double row. Germination can usually be speeded by soaking the seed for about 12 hours before sowing.

Specially prepared seed dusts, available under various trade names, give some protection to newly sown seed against soil-borne disease.

Preparation for Table

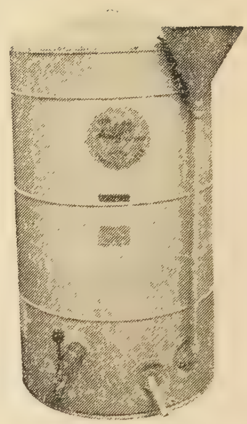
The immature pods of broad beans may be eaten whole if they are sliced in the way usually adopted for preparing runner beans for cooking; young broad beans are quite tasty used raw in salads if they are shelled and the seeds skinned. Skinning is not difficult and with the seed coat removed the beans are sweet and tender.

Varieties

Two main varieties of broad beans are grown in New Zealand, the broad-podded or Windsor type and the long-podded type. The broad-podded type has relatively short, broad pods usually containing about 3 to 5 large seeds. It is represented by varieties such as Broad Windsor, Giant Windsor, and Harlington Windsor. Long Pod and Mammoth Pod are examples of the long-podded type, varieties of which may produce pods up to 16 in. long, though usually they are about 5 to 9 in. long and contain about 4 to 7 seeds.

Dwarf varieties of broad beans are also available. They are well worth growing in small gardens or in exposed situations and they are also useful for sowing in January where conditions are not too hot and dry (or even in February where the growing period is long enough) to mature before winter. The pods contain 2 to about 4 small seeds and are usually attached in fan form. The foliage is

Zip "PEDIGREE" DAIRY HEATERS



An extra "hand" in your dairy

Having a ready supply of hot water in the dairy where it's needed most is like employing extra help. Put a Zip "Pedigree" Dairy Heater on your pay-roll . . . efficient, reliable, will pay its own way with sheer hard work. Check these features of the Zip "Pedigree" Dairy Heater.

★ *25% less heat loss than accepted standards.*
★ *Cases manufactured from enamelled, galvanised iron.*
★ *Fully corrugated copper cylinders.*
★ *Fully lagged with high quality flock.*
★ *Quick action, fast-flow taps.*

WARRANTED by manufacturer's written guarantee for five years.

GUARANTEED to comply with specifications of the Electric Supply Authority Engineers' Institute of N.Z. Limited (Inc.).

Available in 7 sizes from 18 gallons to 45 gallons capacity.

Obtainable from Stock and Station Agents, Dairy Companies and authorised Zip distributors.

Quality costs no more . . . insist on a Zip!

ZIP INDUSTRIES LTD., AUCKLAND, WANGANUI, LOWER HUTT, NELSON, CHRISTCHURCH, INVERCARGILL

Clean up foot rot with a sheep cradle that's

COMPLETELY PORTABLE

ELIMINATES LIFTING!

Here at last is a sheep cradle that's lightweight, compact and low priced. The Hayes "Clarinda" sheep cradle is completely portable and is designed to fit onto the back of the sheep. No lifting of sheep is required.

PRICE ONLY **£6/15/-** *— plus freight.*

POST THIS COUPON TODAY!

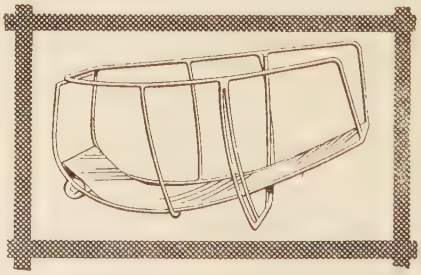
To ERNEST HAYES (N.Z.) LTD.,
Templeton, Christchurch.

Please send me free copy of brochure fully explaining the Clarinda Sheep Cradle.

Name ....

Address ....

....



Hayes 'CLARINDA' SHEEP CRADLE

From your usual Stock and Station Agent or Hardware Merchant

[*Green and Hahn*

Spinach beet or perpetual spinach (left) and silver beet (right) are useful vegetables for winter harvesting.

small, often fairly dark, and the internodes are very short. Examples of the type are Coles Early Dwarf and Dwarf Gem.

Brussels Sprouts

Brussels sprouts should be harvested regularly by the removal of the sprouts as they reach full size. The bottom sprouts should be gathered first. Leaves should be removed from the base as they turn yellow. Plants in exposed situations may have to be staked, as they usually tend to become top heavy with leaves and sprouts as harvesting progresses.

Various diseases which cause spotting or blotching of the leaves commonly develop on members of the cabbage family toward the end of May. If only a few outer leaves are affected, the trouble may be checked by their removal. Where infection is more advanced protective copper oxychloride or other fungicidal sprays may be advisable, though most of the diseases which cause forms of leaf spot increase mainly owing to the cool and moist conditions that occur in late autumn or winter.

Lettuces

Lettuces for setting out or growing in early spring can be sown in May in a favourably situated cold frame or in a favourable situation in the open where the soil is well drained. Where these conditions are lacking it is usually best to defer sowing until July or August. As growth of established lettuce crops is slow in most districts in May, the plants should be kept weed free and the soil between the rows should not be packed excessively by treading on it.

When plants are being set out a sheltered site with a northern aspect where the soil has been well cultivated and manured is desirable. If drainage is poor or the ground likely to be rather cold, young plants should be set out on a raised bed.

Like most salad crops lettuce should be grown quickly. At this time of the year, when in most districts conditions are not good for growth, a light sandy loam rich in well rotted organic matter such as farmyard manure or compost is desirable for growing plants in or setting them out into.

Varieties

Good varieties for setting out in May include Imperial 615 (Neapolitan Winter), Imperial D, Imperial 101, and Triumph.

Peas

Though garden peas are hardy and yields are usually higher and the quality better when the crop matures under comparatively cool conditions, heavy frost is liable to affect the setting of the flowers, and frost after a mild period during which soft growth has developed may damage the haulms. In districts where winter conditions are severe autumn sowing should be done sufficiently early to enable the young plants to become established but not so early that they make soft growth. Losses from autumn sowing may be serious in severe weather, but in well drained soils in districts where winters are not hard autumn sowing is usually satisfactory.

In many districts, however, autumn-sown crops mature little ahead of crops sown in favourable conditions in spring. For autumn and spring sowings seed should be dressed with a suitable seed protectant, such as captan, chloranil, or thiram. The peas should be shaken for several minutes in a tin containing enough of the chemical to coat the seed. Afterward excess should be removed by tapping the tin sharply so that the powder falls to the bottom.

Pea seeds germinate and the plants make vigorous growth at temperatures considerably lower than those suitable for many other vegetables.

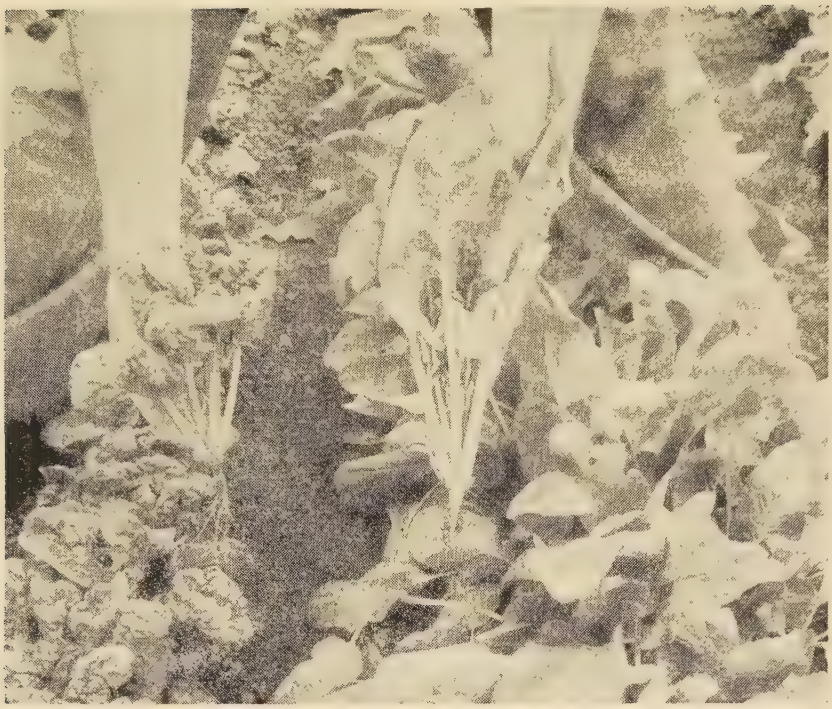
Sowing

Seed should be sown 1 to 2 in. apart in V-shaped or broad, flat drills, which can be drawn out with the hoe 18 to 36 in. apart according to variety. Drills should be 2 to 3 in. deep, except where conditions are hot and dry, when they should be considerably deeper so that, though the seed should not be covered with more than $1\frac{1}{2}$ to 2 in. of soil, the roots will be well down in the cooler and moister levels.

The seedbed should be thoroughly cultivated, as a fine, well prepared seedbed has an important influence on the promotion of even, full germination and uniform maturity at harvest.

Protection of newly emerged peas against birds is essential in some districts, though birds are troublesome mainly in early spring, when food is short. Pea guards made of wire netting are effective if the ends are blocked, but they should be moved before the peas become entangled in the wire. Cotton stretched over the shoots is also effective if a number of strands, which may be criss-crossed or placed in parallel lines, are used.

THE HOME GARDEN IN MAY



[*Sparrow*

Types of spinach: Crumpled leafed (left) and smooth leafed (right).

Manuring

Peas, though they add some nitrogen to the soil and improve the physical nature of most soils, are an exhausting crop, because they have high demands for plant foods. For this reason and because the period between sowing and harvesting of most varieties is comparatively short, the soil should be well cultivated to enable the roots to spread freely and gather rapidly the nutrients needed by the plants.

Crop failures are often due to poor drainage and sometimes to inadequate liming, though liming should not be too heavy, as a neutral or slightly acid soil suits most pea crops. An annual dressing of 3 to 4 oz of lime per square yard is usually satisfactory, though heavier dressings may be needed in high-rainfall districts.

On soils of fairly high fertility, such as virgin soils or those that have been heavily dressed with organic manure for a previous crop, fertiliser applications need not be heavy. A dressing of superphosphate applied at about 1 to 2 oz per square yard may be sufficient, but on most well worked garden soils a complete fertiliser (such as a mixture containing by weight 2 parts of sulphate of ammonia, 6 parts of superphosphate, and 1 part of sulphate or muriate of potash) at 1 to 3 oz per square yard gives good results. Peas are highly sensitive to fertiliser injury and care should be taken that the manure does not come in contact with the seed.

Varieties

Popular dwarf varieties of peas for autumn sowing for early spring cropping include William Massey and Little Marvel.

Spinach

Spinach is a useful vegetable for late-autumn sowing and can be quick growing, maturing under favourable conditions in from about 40 to 55 days. It is hardy when established under cool conditions and can be sown throughout winter in well drained and well cultivated soil that is not too heavy, provided the seedlings can establish themselves without being lifted by frost.

Spinach is one of the few vegetables that will grow at temperatures only slightly above freezing, though the most suitable temperature is somewhat higher. Though seed germinates at relatively low temperatures (40 degrees F. or even lower), seedling emergence is usually delayed where there is frequent heavy rain. Germination is good at 50 to 60 degrees F., but the percentage of seed germinating decreases at higher temperatures.

Types

Spinach can be classified in several ways according to whether the seed is round or prickly, the leaves of the plant are smooth or savoyed (crumpled), or the varieties are long standing or go to seed quickly. Most New Zealand seedsmen still class spinach mainly as either prickly (seeded) or round (seeded), though because of the many very fine varieties produced by overseas plant breeders for specific purposes, more frequent listing of named varieties suited to specific purposes is desirable.

Prickly seeded spinach is usually sold for winter use, as it is generally considered to be hardier than the round seeded. Because it is considered by many to be longer standing, it is also very popular for summer use. This belief in the superiority of prickly seeded spinach is not supported by the evidence of trials of different varieties of the two kinds, as it has now been clearly demonstrated that there are long- and short-standing varieties of both round and prickly seeded spinach; either may have smooth or crumpled leaves.

Soil and Fertiliser

Spinach succeeds in cool conditions on a great range of moist, fertile, well cultivated, and well drained soils. It will not tolerate a very acid soil, and lime should be applied to most soils that have not been dressed recently, though too much lime may cause yellowing of the leaves because of a deficiency or unbalance of certain essential elements, such as manganese or iron.

A good dressing of organic material such as well rotted farmyard manure or compost supplemented by a complete fertiliser with a ratio of about 1 : 2 : 1 of nitrogen, phosphoric acid, and potash which can be made up by using 9 parts of blood and bone and 1 part of muriate or sulphate of potash and applied at 2 to 4 oz a square yard is advisable on most garden soils.

As spinach is a leafy vegetable, extra applications of nitrogen may be supplied, particularly when temperatures are favourable for good growth, by liquid manure or a side dressing of nitrate of soda or sulphate of ammonia raked in along the line of row, but it should not touch the foliage. Liquid manure is preferable where conditions are inclined to be dry, as abundant moisture is essential for high yields and good quality; growth should be reasonably quick, as otherwise some varieties tend to be tough.

Sowing of Seed

Seed should be sown thinly ½ to 1 in. deep in rows 12 in. apart. Plants can be thinned to 4 or 5 to 1 ft of row, though if seed is sown thinly, thinning in the accepted sense is not essential unless conditions are dry or the soil is very poor; it can be confined to the removal of the young plants when large enough for use. In poor soil or in dry conditions crops that have been given generous spacing in the seedling stage usually stand much longer.

For Long Life in the Home

Rubber Needs Proper Care

RUBBER is one of the most durable and labour-saving materials used in the home today. It is resilient, dust free, silent, hygienic, moth-proof, vermin proof, mould-proof, and easy to keep clean. Beside its numerous uses in solid form it also appears as foam rubber (latex foam) in mattresses, pillows, cushioning material for upholstered furniture, and underlay for carpets, where its self-ventilation, shape retention, freedom from dust, comfort, and long life make it ideally suitable. However, rubber has a few enemies which can rob it of all its usefulness and destroy it in very short time.

By MAUD B. STRAIN,
Home Science Instructor,
Department of Agriculture,
Dunedin

THE factors causing deterioration of rubber are:

Heat: Excessive heat quickly weakens and de-natures rubber, making it sticky and lifeless. Shoes with crepe rubber soles should never be placed near a hot fire, as the heat can soften and distort the rubber. Boiling water consistently used in a hot-water bottle softens the rubber so that it finally splits under pressure.

Light, especially sunlight, which is a combination of heat and light, is damaging. It hardens rubber and deprives it of its resilience. The damage is noticed more quickly if sunlight falls on rubber that is stretched and rubber goods made for use or wear outside are specially made to resist sunlight.

Oil, grease, and tar, if left on rubber for any length of time, are absorbed and make the rubber swell and become weak. Castor oil is an exception.

Dry-cleaning fluids damage rubber if left in contact with it for more than a minute or two.

Copper or other metallic compounds are also harmful. Rubber gloves worn while brass or copper is being polished, or when a scouring ball of copper turnings is being used, eventually become soft and sticky, then hard and brittle.

Cleaning

Mild soap and warm water are all that are necessary to clean rubber goods. Soapless detergents are not advisable unless specially stated by the detergent manufacturer to be suitable.

Removal of Spots

Oil, grease, and tar spots should be removed quickly. Usually mild soap and water will be sufficient. Stubborn stains may be removed with a soft cloth slightly moistened with carbon tetrachloride, which should be wiped off immediately with soap and water. The rubber should be treated gently.

Storage

Rubber should be stored in a cool, dark place, but not in the hot-water cupboard or any place where it is likely to come in contact with hot-water pipes or any heating devices. If there is no dark place in which to store the rubber, it should be wrapped in heavy paper and kept in a covered box. It should lie flat and not be folded. If it must be folded (rubber sheeting for instance), talcum powder or French chalk should be sprinkled freely between the surfaces that touch.

Gumboots and Galoshes

These should have the dirt washed off them, soap being used if necessary. They should be dried with a cloth or in a cool, airy place and when stored they should be stuffed loosely with crumpled paper and kept in a cool, dark place.

Hot-water Bottles

These should never be filled with boiling water and never overfilled. Water should be poured in slowly so that air can escape. The bottle should not be more than two-thirds full and the air and steam should be pressed out before the stopper is inserted.

NITROGREEN

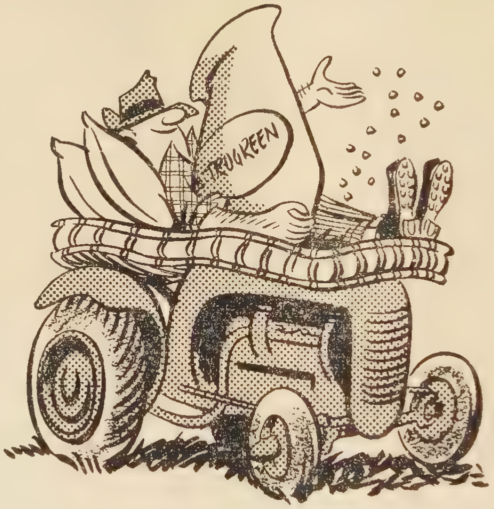
COATED—

NITROGREEN

BETTER STORAGE—

NITROGREEN

NON DUSTING—


NITROGREEN

EASIER APPLICATION

NITROGREEN BOOSTS GROWTH

ORDER YOUR NITROGREEN FERTILIZER NOW

AVAILABLE FROM ALL STOCK AND STATION AGENTS

Nevile Lodge

2

Sole N.Z. Importers:

HENRY H. YORK & CO. PTY. LIMITED

(INC. IN N.S.W.)

AUCKLAND — WELLINGTON — CHRISTCHURCH

BASF

1865

When being stored rubber overshoes, galoshes, and similar articles should be washed, dried, and stuffed loosely with paper. Housework gloves last longer if they are washed, dried, and sprinkled with French chalk or talcum powder to keep the rubber surfaces from sticking.

After use, they should be emptied and hung upside down, with the stopper attached by a piece of cord so that it will not be lost. When stored the bottle should be as dry as possible inside and a little air should be puffed in before the stopper is screwed up to keep the sides from touching. The bottle should be hung up or laid flat and the outside dusted with talcum powder.

Rubber-coated Cloth

Sheets, aprons, and raincoats should be cleaned by being placed on a table and scrubbed with mild soap, warm water, and a soft brush. They should be dried with a soft cloth or hung in a cool, airy place.

For storage they should be dusted with talcum powder before being folded to prevent the surfaces sticking together. Two damp surfaces touching will stick and attempts to free them pull off the rubber coating.

Foundation Garments

These should be washed with mild soap and warm water only. They should be squeezed in the soapy water to remove soiling (any spots difficult to remove can be brushed gently with a soft brush), handled gently, and stretched as little as possible while wet. All traces of soap should be rinsed out and the garment rolled in a towel to dry off some of the water, then unrolled and hung out to dry, but not in the sun and not in a high wind. No ironing is necessary; heat is injurious to rubber.

Rubber Gloves

These are extremely useful to protect the hands when doing wet or dirty work, but as the gloves are likely to come in contact with substances harmful to them (grease and cleaning fluids), a little extra care is necessary to prolong their life. The gloves should be larger than those normally worn and the insides should be powdered freely with French chalk or talcum powder to make them slip on to dry hands easily. A special finish now being applied to the inside by some manufacturers makes rubber gloves easier to put on and take off.

After use, but before they are taken off the hands, they should be washed in warm, soapy water, rinsed well, dried, and powdered. When being removed from the hands they should be pulled off gently from the wrist so that they are inside out when they come off. They should be dried and dusted with talcum powder. If unused for any length of time, they should lie flat in a cool place away from the light.

When detaching an electric plug from its socket never pull on the cord. Always grasp the plug and pull it out gently.

Teats and Caps for Infants' Feeding Bottles

These should be rinsed free of milk at once, as milk fat softens them. They should be washed in clean, hot, soapy water and rinsed in hot water. To sterilise they should each be wrapped in a piece of clean gauze and put on a rack in the bottom of a pan with a little water and a tight cover and boiled for 5 minutes. The pan is then removed from the heat and cooled quickly with the lid still on.

Children's Toys

These can be washed as necessary. They should not be left lying in the sun and should not come in contact with sharp objects.

Draining Mats and Racks

These should be rinsed in warm water and dried after use. Any grease or oil spilt on them should be wiped off immediately.

Electric Cords

When any electrical appliance is disconnected, **the plug and not the cord** should be pulled. Cords should be coiled loosely without kink, twist, or strain and should be kept out of direct sunlight and away from direct sources of heat. Do not let the cord lie on the floor in front of the heater. If the rubber or fabric covering is perished or has been damaged in any way, it should not be used. Imperfect cords are dangerous.

Garden Hose

When not in frequent use a hose should have the water drained out, be coiled loosely, and placed on a flat surface in a cool, dry place. It should never be hung over a single hook or nail. If it must be hung up, it should be coiled loosely and tied in two places with a strip of cloth, then hung loosely over two wooden pegs 6 to 8 in. apart. This should distribute the weight and ease the strain. In use hose should not be kinked or twisted or left in strong sunlight.

Small leaks can be mended by binding on elastic sticking plaster about 1 in. wide, starting on a slanting bias and overlapping about one-third of the width of each round of the tape. If a split occurs in an otherwise good length of hose, it can be repaired by cutting out the damaged part and joining the ends by putting a short pipe inside the hose and clamping the hose firmly to this pipe from outside.

CARE OF RUBBER

Rubber flooring should be washed with mild soap and warm water used sparingly and applied with a cloth, mop, or cellulose sponge. All traces of soap should be rinsed off and the floor dried with a soft cloth. Scrubbing brushes should not be used.

Wringer Rollers

Pressure on the rollers should be even before clothes are put through. Clothes should be more or less evenly spread over the rollers and not put through in uneven bunches or so much at a time that the wringer is stalled or strained. Buttons and buckles should be folded inside.

After use the rollers should be well rinsed with clear water. The tension should be loosened and a piece of towel or other cloth left between the rollers to keep them from touching each other. They should be dried and covered.

Rubber Flooring

This is available in sheet or tile form and makes a practical flooring for bathrooms and passages. It is long lasting, hygienic, and draught-proof, has warmth and resilience, and effectively deadens sound. It is not suitable for a kitchen floor where it is likely to come in contact with grease and it is not sufficiently resistant to heat to be fitted under some cookers and heaters.

The floor should be swept regularly with a soft broom. It should be washed with mild soap and warm water applied with a cloth or mop. Scrubbing brushes should not be used and water should be used sparingly. All traces of soap should be removed with clean, warm water and the floor dried with a soft cloth.

Abrasive soaps and powders, caustic soda, petrol, turpentine, and other spirits should not be used. Soapless detergents should not be used unless they are recommended for the purpose by the makers. Stubborn stains such as tar may be removed by wiping with a cloth slightly moistened with carbon tetrachloride, but this must be wiped off immediately with soap and water. Too frequent use of carbon tetrachloride will damage the floor.

Rubber flooring may or may not be polished. The regular use of a suitable polish tends to preserve the flooring, and dirt and traffic marks are more easily removed from a polished surface. However, only water wax emulsion polish should be used on rubber floors; the solvents in other types of polish are harmful to rubber. The water wax emulsion is self polishing, but is improved by polishing and by buffing up between applications.

Rubber floors should be protected from the indentations which heavy furniture makes by use of castor cups and similar devices which distribute the weight of the furniture.

Foam Rubber Mattresses and Cushions

These do not of themselves form dust nor do they collect it, but covers should be kept free of dust and lint from the blankets by brushing the mattress with a whisk broom or by the appropriate attachment of the vacuum cleaner. Mattresses can be changed end for end occasionally but they are not reversible. They should be supported on a firm base which must allow free access of air. Taut woven wire, coiled springs on a firm base, wooden slats, or plywood with ventilation holes are all satisfactory.

If mattresses must be stored, they should be placed flat in a cool, dark place and no more than one mattress should rest on top of another.

Chairs, settees, or other furniture upholstered with foam rubber should not be permanently in a sun room or a room where the sun shines directly on them. Though the rubber is not uncovered, the heat from the sun can penetrate the covering. For short periods this would not be harmful, but over a long period it could be.

Cleaning Fabric Covers

After loose dirt has been removed with a brush the vacuum cleaner can be used. Dirty marks and stains can be removed from the cover by using a cleaning agent applied with a piece of soft cloth. Suds made from mild soap with a little household ammonia added are satisfactory, though commercial cleaning agents can be used. Dry-cleaning fluids, petrol, kerosene, and other spirit solvents should not be used, as they are harmful to the rubber underneath. After the cleaning agent has been used, the cover should be rubbed with a cloth wrung out in clean water, then dried with a dry cloth.

All types of upholstery-covering material are used with foam rubber, some of them without an undercover, but for plastic materials without a fabric backing an undercover of fairly heavy calico or drill should be used. Latex foam rubber when in use should always be covered to protect it from the light and from grease spots. When uncovered it should be stored in a cool, dry situation out of contact with direct sunlight, preferably in the dark.

Photographs by Campbell.

Read the Directions

MANY households are familiar with the piece of equipment eagerly bought, impatiently tried out, and regarded with disappointment at the end of its trial because its performance was not up to expectations. The same article later often fulfills all its promises when used by another member of the household, the difference in performance being simply because before the second trial the operator read the instructions.

The manufacturer has made his piece of apparatus to be used and to be looked after in a certain way and only if his directions are followed can the article be expected to maintain its standard of performance and trouble-free running.

Because a person knows how to use one particular piece of apparatus, it does not follow that she knows how to use all makes and all models of that particular article.

A good general rule is: Become familiar with the instructions before attempting to use the article, and if in doubt at any stage, stop and read the instructions again.

—MAUD B. STRAIN,
Home Science Instructor,
Department of Agriculture,
Dunedin

Heaths in the Flower Garden

[*Green and Hahn*

A border of hardy heaths.

HEATHS and heathers are both plants of the Erica family and in this article J. P. Salinger, Horticulturist, Department of Agriculture, Wellington, describes the species of erica and their cultivation in the flower garden. Most are useful and easily grown garden plants providing a bright splash of colour over a period and being particularly useful for decorative work.

THE heaths or ericas are a widely distributed group of plants which occur naturally in Europe and South Africa. There are several related plants with a similar habit in Europe, notably calluna or ling and Irish heath. In Australia and New Zealand none of these plants is native, the nearest related being epacris, gaultheria, and pernettya. These have similar cultural requirements to ericas and so are included in the description of heaths which are cultivated in our gardens.

As with many other plants grown in our gardens there are many varieties of the European species but few varieties of those from the Southern Hemisphere and this will obviously affect the choice and method of propagation of these plants. The European ones are very hardy and unsuitable for the warmest areas while the South African heaths are half hardy and grow better in the warmer areas.

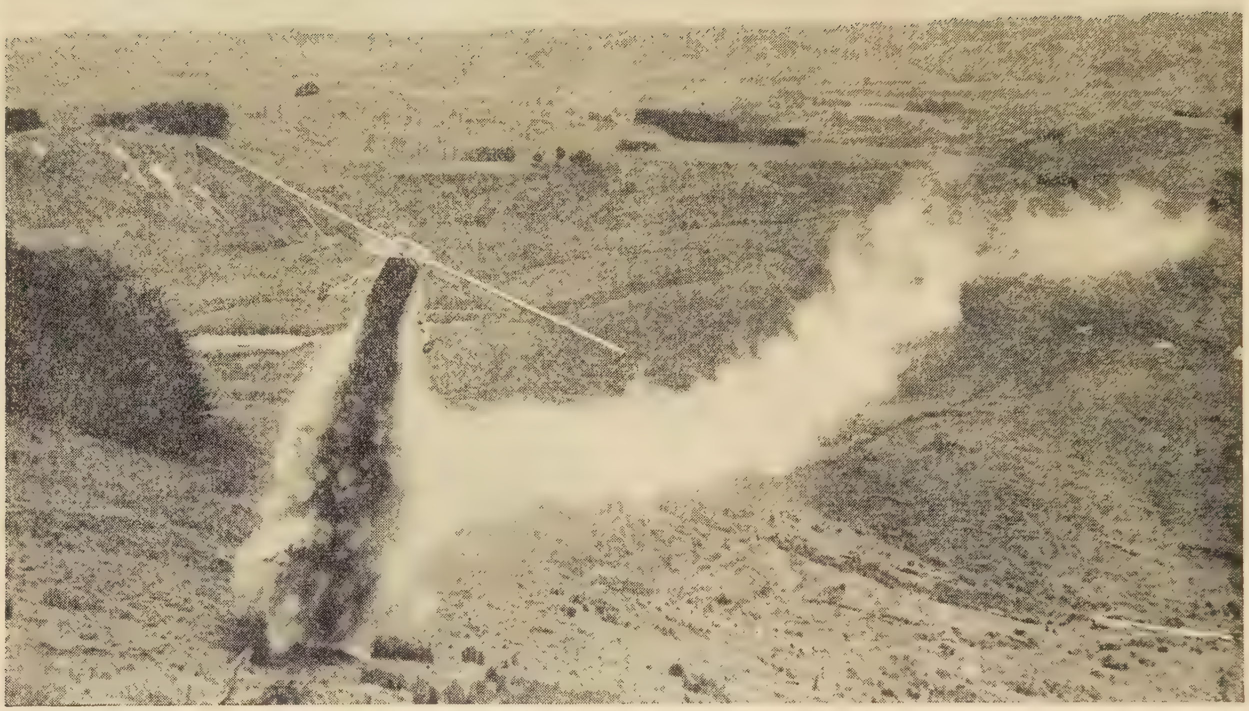
In parts of New Zealand some ericas and related plants have become naturalised or are even considered weeds. In Tongariro National Park ling (*Calluna vulgaris*) covers large areas of unimproved tussock country. In the north *Erica baccans* grows wild but is not a troublesome weed, while Spanish heath (*Erica lusitanica*) and the tree heath (*E. arborea*) are weeds in parts of Marlborough and Nelson provinces, but are found wild only occasionally elsewhere. It is doubtful whether any of them will prove as aggressive as broom or gorse, but as the plants are not easily killed by chemical methods of weed control, their spread to agricultural land should be watched carefully.

Use in the Garden

Most of the ericas are dwarf or medium height, only a few species growing taller than 6 ft, and even these may be kept quite small if the flowers are gathered for the house and the young shoots trimmed back.

[*Green and Hahn*

▼ *Erica darleyensis* grows about 2 ft high. It is hardy and flowers in winter.



The bright idea that created a problem

The man who first thought of aerial top-dressing certainly started something. This new technique, pioneered and developed in New Zealand, placed new resources into the hands of producers—and created new problems for transport organisations.

In 1950, about 5,000 tons of artificial fertilisers were distributed from the air over a little less than 50,000 acres of land. So remarkable were the results that, within *six years* the figures had increased no less than *eighty-fold*. The fact is, that on suitable land, a farmer's wool clip can in five years be substantially increased and possibly doubled in weight by aerial top-dressing combined with oversowing and (in many cases) the provision of additional fencing and irrigation. In livestock farming, too, equally substantial improvements result.

That was the 'bright idea'.

Now for the problem.

Before the producer can profit by his enterprise, his output must be carried to the waiting markets of the world. And so increased output calls for increased transport facilities by road and by rail and increased handling capacities at freezing works and harbours.

And, in the final analysis, it will call for an increased service of ships. That, in turn, may mean building more new ships and every ton of new shipping calls for a capital provision by the Lines of £250, for in these days an average refrigerated cargo liner will cost every penny of £2,500,000.

One thing, however, is certain. The increased output which follows the use of new production methods will continue to flow smoothly and surely from New Zealand to the markets of the world. In co-operation with Produce Boards, Railways and Harbour Authorities and the waterside workers, the ships will keep New Zealand's life-line open.

They have never failed you yet.

Issued in the interests of mutual understanding by

NEW ZEALAND OVERSEAS SHIPPING LINES

SHAW SAVILL & ALBION CO. LTD · THE NEW ZEALAND SHIPPING CO. LTD · PORT LINE LIMITED · BLUE STAR LINE LIMITED

Though individual plants may be quite attractive, groups of one variety are much more effective, especially with the paler colours.

They may be planted toward the front of a shrub or mixed border among taller, more upright plants or, if plenty of plants are available, they may be used as ground cover under deciduous shrubs and trees.

The dwarf types are excellent for rock gardens or covering a bank, and all of them are suitable for interplanting between evergreen azaleas and spreading varieties of camellias and for providing soil protection to stem rooting lilies.

Soil Requirements

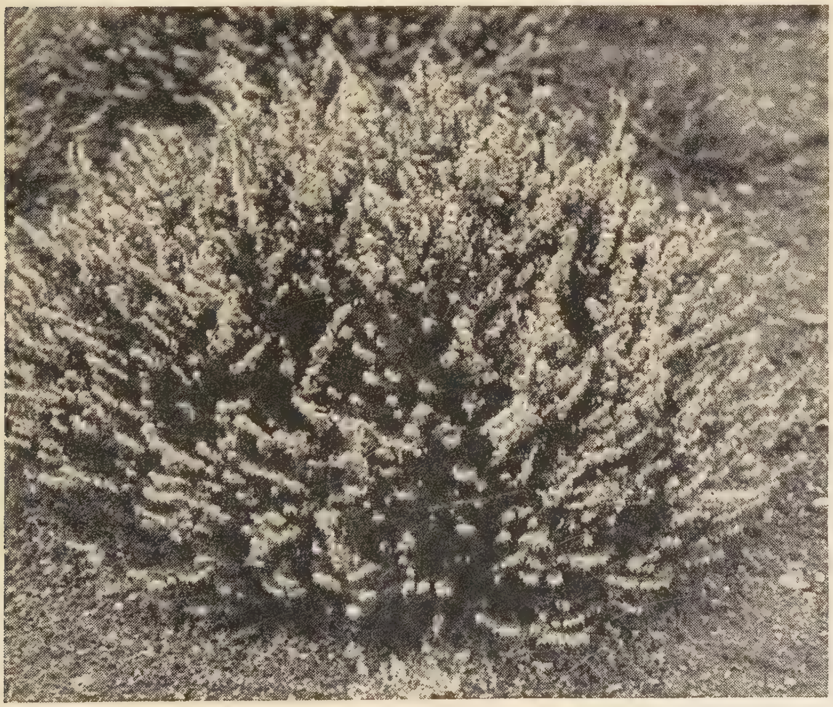
The essential feature of heath culture is that the soil should be acid or, if nearly neutral, that no free lime should be present in the soil; one species, *Erica carnea*, will tolerate less acid conditions than the others, but even this will not thrive in alkaline soils. Soil acidity can be increased by applying sulphur at 1 oz per sq. yd., but this should not be necessary, especially if acidifying fertilisers such as sulphate of ammonia are used.

The soil should be reasonably well drained; the texture of poorly drained soils can be improved by incorporating peat, leaf mould, or rotted sawdust and light soils in drier areas can be improved with well rotted compost.

In general, though, heaths do not need organic matter in the soil and benefit more by mulching with rotted compost or sawdust to which 4 oz of sulphate of ammonia per square yard is added. The only additional manuring is the application of blood and bone at 6 oz per sq. yd. in spring or a mixture of equal parts of sulphate of ammonia and superphosphate at 4 oz per sq. yd.

▼ ***Erica carnea*** **is a hardy winter-flowering heath with several named varieties.**

[Green and Hahn

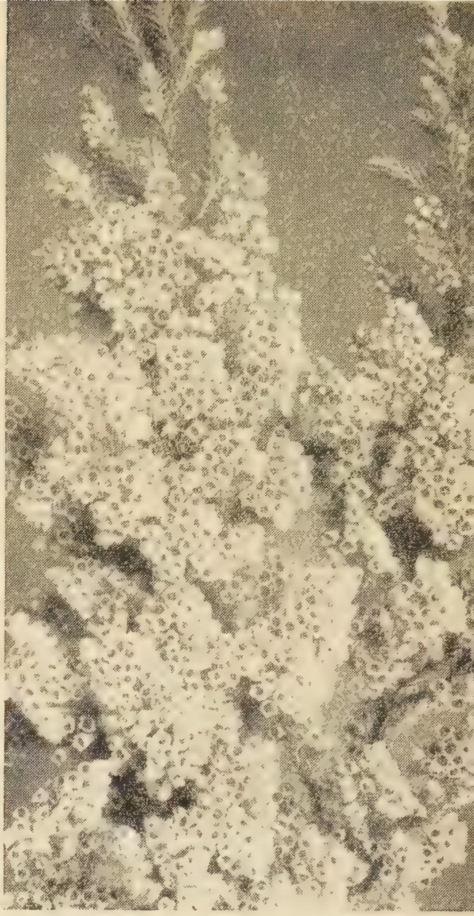


As with other plants of this family certain beneficial fungi known collectively as Mycorrhiza penetrate the roots of the heaths and assist in the plants' nutrition.

Planting

Heaths can be planted at any time from April until the end of September. Plants bought in pots may be planted even earlier or later, as they are frequently offered for sale in flower and will grow on quite satisfactorily if they are carefully watered in when they are planted and protected by sacking or plastic sheet from excessive wind or sun. Newly set out plants do not need frequent watering; they will benefit by two or three heavy waterings at intervals in dry weather and a light damping between the waterings.

Before setting out plants it is important to see that the root ball is thoroughly moist; the bushy, fibrous roots can completely penetrate the ball of soil round them and if this is dry, it is difficult to moisten again once the plants are in the ground. If the degree of dampness of the soil and roots is in doubt, the ball should be stood in a bucket of water for half an hour before planting. Where roots are wrapped in scrim, this should not be removed completely until planting. It is better to set out plants with moist roots in drier soil rather than plant a dry root ball in wet soil. Plants should be set out with the top of the root ball just below the soil surface.



[Elliott

Erica "Dawn" has silvery pink bells in spring.

Maintenance

The soil round establishing plants should be lightly hoed, but the surface never penetrated more than half an inch, as the roots develop near the surface; a mulch of well rotted organic matter can be applied in mid December the first year and added to each subsequent year so that soil cultivation is kept to a minimum and weeds suppressed.

Heaths require light annual pruning. Each year after flowering the tips of the season's growth should be shortened back slightly and the old flower heads brushed off with the hand unless they are required for seed. Many varieties do not produce new growth if cut back into older wood, but the cutting of sprays of flowers for decoration will not harm the plants and in fact is a form of pruning.

HEATHS IN THE FLOWER GARDEN . . .

Heaths are remarkably free of pests and diseases, though they are occasionally killed by soil borne fungous diseases such as phytophthora. The damage can be restricted by drenching the soil with copper oxychloride at 1 lb to 10 gallons of water applied at 2 gallons per sq. yd., but plants will not tolerate repeated applications of this copper soil drench. The dwarfer varieties harbour snails, which do not seem to attack the heaths themselves; so slug bait should be used round them, if other plants are being eaten.

Propagation

Heaths are propagated from cuttings, layers, and seeds. Named varieties are raised only by vegetative methods; this applies especially to varieties of the European species.

Vegetative Propagation

All heaths can be raised from cuttings taken from the young tips of the shoots in January or February; small side shoots with a heel of older wood may also be used. They should be inserted in a compost of equal parts of peat or leaf mould and coarse sand. The usual method is to insert the cuttings round the edge of a 4 or 5 in. clay pot. This should be well watered and then placed in a larger pot or box which is covered with a sheet of glass and placed in a warm place shaded from direct sunshine. A moist atmosphere must be maintained, but the compost must not be kept too wet.

When rooting has started there will be a definite development of new growth at the growing point. The atmosphere can now be drier and the cuttings transplanted. As the roots are thin and hairy, the whole pot should be carefully tipped out and the cuttings separated, each with a small amount of compost round the roots. These small plants should then be potted up singly in small pots of the same mixture to which 4 oz of bone meal per bushel of soil is added. The pots should be set out in a sheltered position.

Some of the European species can be propagated from larger cuttings taken in April or early May and set in sandy soil in a cold frame. Many of the dwarfer species will layer naturally if sandy soil is worked in round the bases of the plants in spring. The rooted side shoots are cut off and transplanted in late April or May.

Raising from Seed

Many of the South African species can be raised from seed; the flowers should be collected when dry, care being taken to pick the seed capsule as well. These should be placed in a container in the sun and the fine seed will then fall out. This may be cleaned of other plant material by shaking through a fine sieve on to a sheet of white paper. The name of the plant should be written on the paper if the seed of more than one species is being collected. The best times for sowing seed are late February to early May or in September.

Seed boxes or pots should be used and plenty of drainage material placed in the bottom. A suitable soil mixture is equal parts of sterilised loam, peat, or leaf mould and coarse sand or pumice. The container should be watered before sowing and the seed lightly and evenly sown over the surface. It should be covered with a very thin layer of the sand or pumice or sphagnum moss rubbed through a fine sieve.

The container should be covered with a sheet of paper, a pane of glass, or a piece of asbestos sheeting. Except where paper is used, one corner of the covering material should be raised

Photos on opposite page by Elliott.

Species of Heaths and Related Plants

COMPARED with other shrubs heaths are small plants. In the following descriptive lists dwarf is up to 2 ft high, medium 2 to 4 ft, and tall 4 to 6 ft or more.

Hardy Species (Withstand Severe Frosts)

Erica arborea (tree heath): A white winter-flowering tall species which has become naturalised in some areas. The flowering shoots are cut and used by florists. *E. lusitanica* (Spanish heath) is similar.

E. carnea: A most useful dwarf winter-flowering species, with several white, pink, or red varieties; will tolerate slightly less acid soil than other species.

E. cinerea (Scotch or bell heather): This is the wild heather of the Scottish moors with rosy purple flowers in late summer; there are both white and deeper pink varieties.

E. darleyensis: A hybrid between *E. carnea* and *E. mediterranea*. A good moderately dwarf winter-flowering shrub. Pale pink.

E. mackayi: A dwarf shrub with rose-coloured flowers in late summer.

E. vagans (Cornish heath): Purplish pink flowers. The variety "Mrs D. F. Maxwell" is a more attractive plant than the species.

Calluna vulgaris (ling): Grows wild in parts of New Zealand. Many garden varieties are excellent dwarf shrubs flowering in late summer; in particular the double white "*Alba plena*" and pink "H. E. Beale" will grow in all except the warmest parts of the country.

Daboecia cantabrica (syn. *polifolia*) Irish heath: This plant has larger bells than most of the other hardy heaths; it flowers in late summer and there are white, pink, and purple varieties.

Gaultheria antipoda (snowberry): A New Zealand native plant; with pink or white berries; suitable for the rock garden.

Pernettya nana: A very dwarf native shrub with red berries.

Pernettya macrostigma (syn. *Gaultheria perplexa*): A native with rose-pink berries.

Pernettya mucronata: A hardy dwarf shrub from South America with attractive white, pink, or purple berries.

Half-hardy Species (Withstand Frosts to 10 Degrees)

Erica baccans (berry heath): Tall and has become naturalised on clay soils round Auckland. Small heads of mauve-pink flowers at tips of shoots. Flowers are cut for florists and retain their colour when dry.

E. bowieana (bridal heath or Albertinia heath): Tall; the white tubular bells of flowers appear all the year. In South Africa there is also a pink variety.

E. caffra: Tall; whitish flowers in early spring.

E. canaliculata: Considered to be the correct name for *E. melanthera*, a strong-growing shrub flowering in autumn and winter with mauve bells. An excellent shrub for winter colour.

E. cavendishiana: A hybrid of moderate height and with bright yellow flowers.

E. cerinthoides: Medium height, brilliant scarlet hairy bells of flowers from late winter.

E. cruenta: Tall; brilliant deep scarlet tubular flowers produced over a long period.

E. diaphana (syn. *E. transparens*): Medium height; translucent pink bells with a white tip; flowering in winter and spring.

Erica "Dawn": Medium height; a hybrid raised in Australia; silvery pink bells in spring.

E. glandulosa: Medium height; pointed hairy or sticky shoots with curved tubular pink bells appearing most of the year. Dead flowers need removing by hand.

E. mammosa (Red Signal heath): Medium height; drooping scarlet tubular flowers produced during most of the year along the shoots.

E. oatesi: Considered to be the correct name for Erica "Winter Gem". This dwarf plant produces a brilliant display of bright red bells in winter.

E. parkeri: Medium height; satin-like pink tubular flowers in dense heads in spring.

E. peeria rosea: Dwarf; clusters of pink bells in early summer.

E. peziza: Dwarf; clusters of sweet-scented white bells in spring.

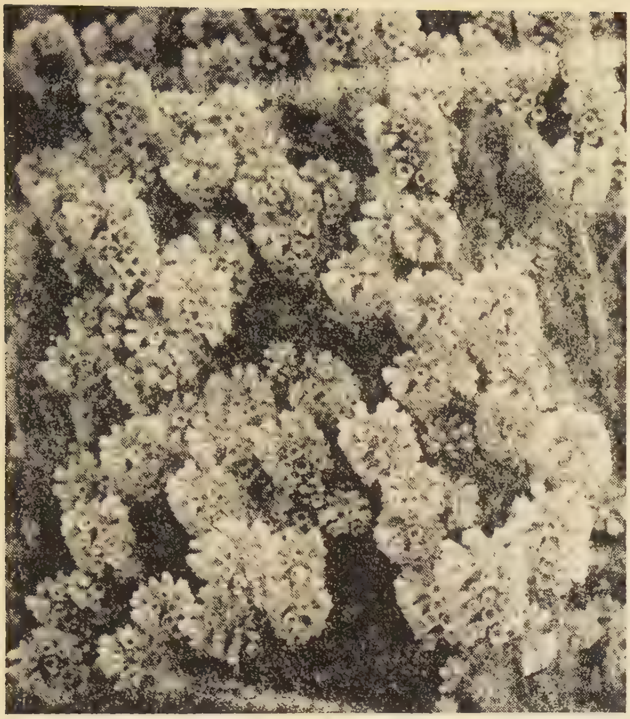
E. rubens: Dwarf; coral pink bells in autumn and winter; pale green leaves.

E. ventricosa (wax heath): Tall. The popular name accurately describes the glistening pink, swollen tubular flowers clustered at the tips of the shoots. Flowers from spring to autumn. Varieties with paler or deeper pink flowers are available.

E. willmorei: Tall. Probably a hybrid. Pink and white tubular flowers all through winter. A popular commercial cut flower species.

Erica "Winter Gem" (see *E. oatesi*).

Epacris: Both in Australia and New Zealand several species of epacris are native plants. Though some are valued in Europe as flowering pot plants, they are not usually grown in gardens in New Zealand. The native *E. pauciflora* would justify growing as a dwarf flowering shrub. It produces white tubular flowers in spring.



The clustered rose pink bells of *Erica peeria rosea* are useful for floral decoration.

Erica ventricosa has swollen tubular flowers during spring and summer.

▼ Red Signal heath (*Erica mammosa coccinea*), which flowers most of the year.

▼ *Erica oatesi*, usually called Erica "Winter Gem", is one of the brightest dwarf winter-flowering plants.

Epacris pauciflora, a dwarf native shrub related to the heaths, deserves a place in our gardens.

slightly with a small block of wood to prevent excessive condensation. The container should be placed in a shaded frame or greenhouse and watered when necessary by standing in a trough of water.

Germination is slow, usually about 6 weeks. When it takes place the covering should be removed. When the plants are ½ to 1 in. high they should be transplanted into other boxes or very small pots. Great care is needed as the roots are surprisingly long for such small plants.

After they are transplanted they should be watered in and set in a shaded place until they are growing away, when they can be grown on in a more open position, provided some shade is given in hot weather with scrim or laths placed over the area.

When well rooted and growing satisfactorily the plants should be set out in a nursery bed of open soil in a partially shaded position before being planted out finally when about 1 year old.

Garden Work for May

By ROSALIE A. CAMPION,
Horticultural Instructor,
Department of Agriculture,
Wellington

The May holidays are a time when controlled fires outdoors are popular. If children are encouraged in early years to help with cleaning up and burning rubbish, the gardening instinct may be fostered and remain for life. This is an excellent time for the burning of any diseased plant material and for cleaning up any corners which have not been given attention during the busier, summer months. Grassed areas which have been allowed to seed could be cut off with a scythe or sickle and the rubbish raked off and burnt.

Lawns

In the milder, northern districts it is not too late to prepare and sow down new lawns. Where frosts are experienced it is better to wait until spring before sowing, as the young seedlings may be checked. Hard frosts can lift the soil, and the roots of young seedlings, unless well established, will be damaged. Bare patches in old lawns should be "scarified" by raking stiffly to break up the soil, topdressed with new soil if necessary, and reseeded. A satisfactory seed mixture for use on new lawns or for reseeding consists of two parts of Chewings fescue and one part of certified browntop.

To obtain a good growth response a fertiliser should be applied and raked in with the seed. On most soils a mixture of three parts of sulphate of ammonia and one part of superphosphate, used at ½ oz per square yard, has given good results. Blood and bone is an unsatisfactory lawn fertiliser, as it encourages growth of weeds and of fungi which cause open patches in a lawn.

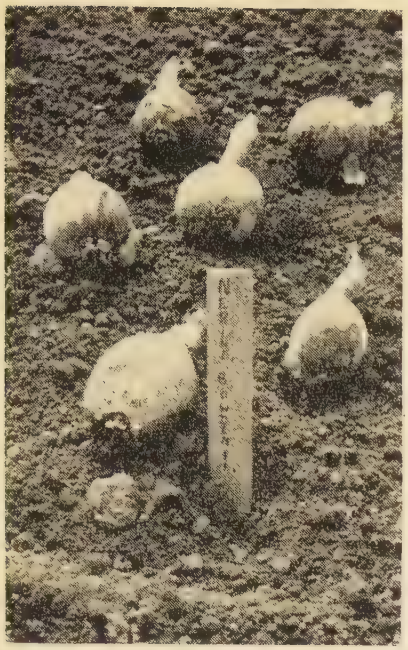
Weeds

The joints of steps, paths, and drives often harbour difficult weeds and periodical treatment with chemicals will prevent the breaking of asphalt and other materials when eradication of weeds is attempted. Arsenical weedkillers will kill all plant growth, but care must be taken to keep them out of reach of children and to destroy the containers or bury them deeply. Other useful materials are based on sodium chlorate and borates. A complete weedkiller can also be safely made from two parts of dalapon and one part of amitrol applied at 1 oz to 20 sq. yds. in autumn and again in spring.

Mechanical methods are still the best for removing many perennial weeds from the flower garden. A heavy mulch of sawdust can encourage the weeds to grow into the surface area, where removal is easier. For a more detailed list of weed control methods in the flower garden, see the November 1957 issue of the "Journal".

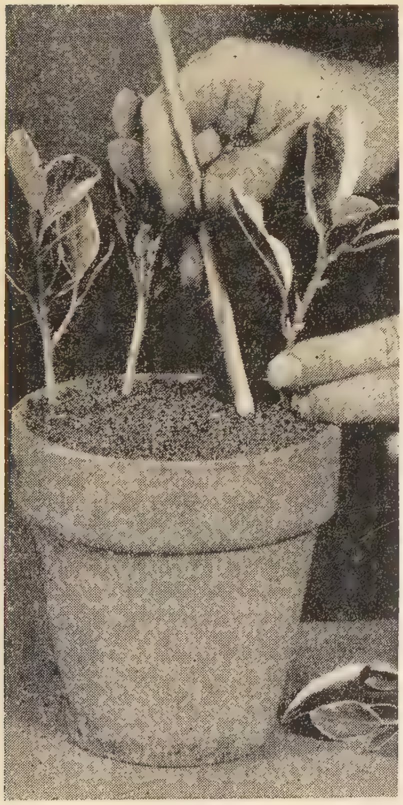
Dahlias

Except in the mildest areas dahlia plants should be lifted each year when the frosts have touched them. While there is sufficient growth to identify them the plants should be rogued and any discarded which may be infected with virus or which, because of their type, colour, or growth, do not warrant



▲ Correct spacing of bulbs of *Nerine bowdeni*, which should be planted with their necks above ground level.

▼ Cuttings of evergreen shrubby materials being inserted firmly to root in a pot of coarse sand.



a place in the garden. If new plants have not made a very good display, it may be worth giving them a second trial. Tubers should be stored in moderately cool conditions.

Chrysanthemums

The late-flowering varieties of chrysanthemums will be nearing maturity and some shelter should be provided for the flowers. The plants are very hardy, but bad weather can spoil the flowers, especially of the large exhibition types. After they have been grown for several months it is folly not to cover them with light scrim or plastic at this time.

If the plants should suddenly wilt and die, the root area should be checked for waterlogging or the presence of grass grubs, and if these are not the cause of the trouble, the most probable cause is the verticillium wilt fungus, which inhabits the soil. Where this disease occurs plant debris should be burnt and not composted. It is unwise to grow susceptible plants such as stocks, luculia, *Rhus cotinus*, Iceland poppies, or gerberas on this area for three to four years. Such a wide range of plants are affected by this fungus that consideration should be given to sterilising the soil with formalin or vapam.

▲ Raising plants from cuttings is one of the many uses of a cold frame.

If leaf spotting is troublesome sprays of thiram at 1¼ oz to 4 gallons of water should be used. Most insect pests of chrysanthemums are controlled by the application of lindane emulsion at ½ fl oz to 4 gallons of water. and this can be applied with thiram if necessary. If brown rust pustules are evident, sprays of zineb should be applied.

Tomato Spotted Wilt Virus

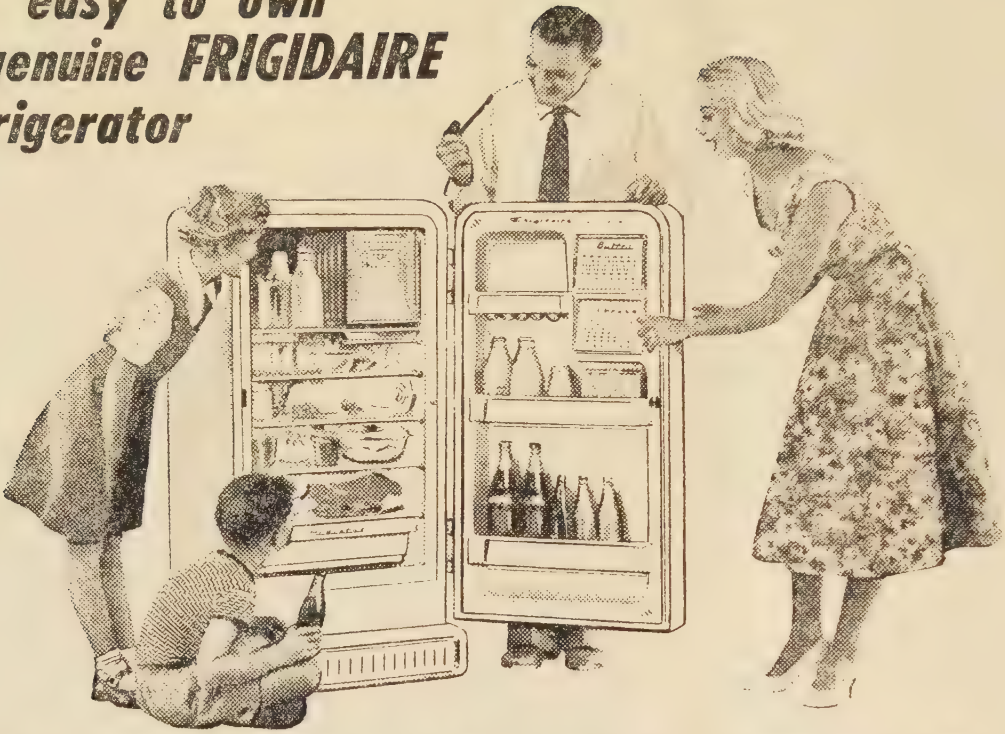
The tomato spotted wilt virus has a wide host range among ornamental plants. Dahlias and chrysanthemums are two of the most susceptible plants. Diseased plants are usually stunted and have fewer and smaller flowers. On the leaves the usual symptoms are light-coloured ringspots or light-coloured areas composed of a series of wavy lines. The symptoms are often inconspicuous and overlooked, thus remaining a constant source of infection to other susceptible plants such as callas, cinerarias, anemones, primulas, and Iceland poppies. There is no cure for this disease and all infected plants should be burnt. Keeping garden areas clean will destroy alternative weed hosts such as buttercup, black nightshade, and henbane. Nasturtiums, another host, should be carefully examined for symptoms such as wavy leaf edges and mosaic mottling of the leaves. The disease is spread from plant to plant by small black insects known as thrips, which should be controlled by spraying with DDT or dieldrin emulsion.

Lilies

Lily bulbs should not be lifted for replanting until their new position has been prepared by digging to a depth of 18 in. and incorporating any available organic matter. Plantings should be grouped, the bulbs being placed at their original depth with at least twice their width between them.

Most lilies are easily raised from seed, and for large gardens especially this is an economical method of obtaining a good display, though it takes several years. The seed should be sown as soon as it is ripe into a soil which drains freely and is rich

It's easy to own a genuine FRIGIDAIRE refrigerator



ONLY A FEW POUNDS DEPOSIT AND SHILLINGS WEEKLY

. . . and you have assured food protection, a "must" for family health. Or, you may have the down payment already in your kitchen . . . your old refrigerator. You can trade it in as a deposit for a new Frigidaire, which you can then pay off for only a *few* shillings each week.

S58 5.8 cu. ft. Special Model	£88/10/-
D62 6.2 cu. ft. De Luxe Model	£99/10/-
D88 8.8 cu. ft. De Luxe Model	£127/10/-
SD83 8.3 cu. ft. Super De Luxe	£143/ 0/-
D120 12 cu. ft. De Luxe Model	£184/0/-
CI-100 10 cu. ft. Cyclamatic Food Freezer/Refrigerator	£177/10/-

Just compare these Frigidaire Features:
Exclusive Butter Warmer. No more oily or rock-hard butter. It's always right for spreading. **Separate Cheese Compartment.** Prevents odour transfer. **Pantry Door,** with shelves for eggs, bottles and other hard-to-find items. **Large, Super-Freezer.** Ample storage for frozen foods and ice cream at sub-freezing temperatures. **11-position Cold Control,** with semi-automatic defrost. **Full Width Hydrator,** to keep fruit and vegetables crisp and fresh. **One-Piece,** wrap-around, all steel cabinet with porcelain enamel interior and high-bake Dulux exterior. Also: **Exclusive "Meter-Miser"** cold making mechanism. Uses less current than an ordinary light bulb.

GM
GENERAL MOTORS

FRIGIDAIRE

Registered Trade Mark

Distributed by the Frigidaire Division of General Motors New Zealand Limited through a New Zealand-wide Network of Authorised Dealers.

TRADE IN – TERMS – SEE YOUR FRIGIDAIRE DEALER

in organic matter. If a space cannot be set aside as a seedbed in the garden, the seed can be sown in boxes of seed compost. The seed should be dusted with thiram fungicide before it is sown, and where slugs or snails are prevalent suitable baits should be set out. The seed can be covered with a ½ in. layer of sand and sawdust.

Lilium regale and *L. formosanum* are two varieties which quickly develop leaves after sowing, but the popular *L. auratum* may not show leaves until a year later.

Roses and Black Spot

This season has brought with it a general infection of black spot fungus on roses which have not received sufficient preventive sprays of fungicide. This fungus causes purplish or black spots on the leaves and sometimes on the stems and weakens the plants. The disease is carried over from year to year on diseased plant material, generally the leaves which fall to the ground. All infected rose leaves should be picked up as they fall and burnt to help prevent trouble next season.

If rambler roses have not already been pruned, this should be done now by the removal of all branches which flowered last season. This will allow the sunlight to mature the young growths, which can now be tied into place for flowering next season.

Caterpillars

A number of shrubby plants are disfigured each year by the activities of the leaf-roller caterpillar, which feeds on the foliage and makes a resting place between two leaves, which it webs together. Camellias, boronias, correa, grevillea, pittosporum, and rhododendron are some of the many plants affected and should be sprayed with arsenate of lead or malathion if they are troubled. DDT is rarely effective against this pest.

Another curious caterpillar which shelters in a tough brown elongated bag is the young stage of the bag or case moth. These moths are capable of rapidly defoliating such plants as *Cupressus macrocarpa, Pinus radiata,* and manuka. Where warranted sprays of arsenate of lead or DDT can be used for control.

Border Preparations

Deep digging of beds encourages the development of good roots and helps the winter rains to penetrate. Even if the border is not being completely overhauled this season, it should be lightly forked to assist aeration. At all times pieces of glass or broken china should be removed as they are forked to the surface. This may prevent an accident in future. The border should receive a light dressing of lime as it is dug, and bearded iris can now be given an annual dressing at 3 oz per square yard.

Cinerarias are suitable bedding plants for semi-shaded positions.

Iris innominata can now be divided and planted out. This delightful species flowers for a long period in spring and can be planted out in average soil in sunny positions. Ixia and *Nerine bowdeni* can still be planted in sunny borders. In cooler areas Solomon's seal and lily of the valley are useful plants which can be planted now.

Planting out

The planting out of spring-flowering plants such as wallflowers, myosotis, aubretia, primroses, polyanthus, bellis, winter pansies, and violas should be completed as soon as possible.

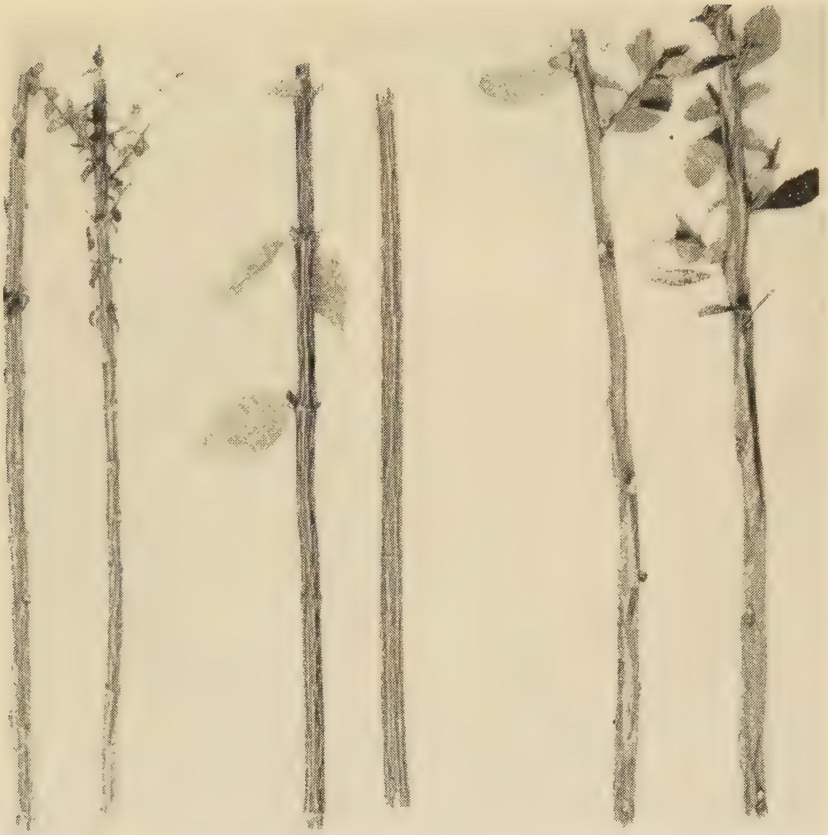
With this month begins the planting period for trees and shrubs. Much of this material is now being sold while in flower in pots, and as the roots are not greatly disturbed when planted from a pot, the planting season has been extended. When the plant is taken from the pot the soil may be broken slightly so that the roots merge with planting soil. Pots should be well watered on the day before planting.

Use of Cold Frame

A garden frame is substantially a large box which has a glass lid facing to the sun. It is known as a "cold frame", as though it is often used for propagation, it has no internal heating apparatus and is generally used outdoors.

At this time of the year such a frame can be used to give additional protection from frost to many plants including boxed and rooted geranium cuttings and seedlings of biennials, stocks, sweet peas, carnations, and other plants which are to be set out in spring. The frame can be used to store half-hardy plants such as irisene, fibrous begonias, cuphea, agathea, and double-flowering lobelia to give them shelter over the winter months. Dahlia tubers and chrysanthemum stools can be placed in sawdust in the frame for storage or the frame could be used for rooting of cuttings as mentioned last month. The hardwood cuttings should be placed in a gritty medium.

The frame should be watered according to the requirements of the



Desirable types of cuttings of hedge and shelter plants. Left to right: Lonicera, abelia, and escallonia.

▼ A rooted layer of *Daphne odora rubra* being severed from the parent plant before it is planted out.

plants which it holds. On fine days the frame can be opened up by 10 a.m., but it should be closed in the mid afternoon to prevent loss of heat. On dull and cold days it should be opened an inch or two only for ventilation. If heavy frosts are expected, a covering of scrim placed on top of the glass will prevent the frost from penetrating.

Plants in Glasshouses

Under glass young bushes of fuchsias, geraniums, and cherry pie can be pinched back to train them into bushy plants. Pinching plants back entails the removal of the growing point down to a node below which it is hoped a number of shoots will develop. Old bushes of these plants should have a restricted water supply so that they may have a resting period.

Seed of cyclamen for next year's flowers and of chaubard and marguerite carnations, pansies, and violas for spring planting can now be sown. A pinch of fungicide such as thiram should be shaken in each packet of seed to aid germination.

Cyclamen plants which are coming into flower should be given a light, airy position under conditions which are not too warm. When watering care should be taken that water does not accumulate in the top of the corm and encourage rotting.

General

In light warm soil outdoors seed of larkspur, godetia, clarkia, nigella, and antirrhinums can still be sown. Self-sown seedlings and plants from earlier sowings can be thinned out or transplanted to other positions.

Cinerarias should be inspected regularly for the presence of the woolly-bear caterpillar. If numbers are few, hand picking is the easiest way of control, but if this is not practicable, dust or sprays of DDT should be used.

Layering of plants can be continued this month and any plants which were layered last year and have developed roots can be severed from the parent plant. Under good conditions they could be transplanted immediately, but it is generally better to wait until early spring to transplant them.

Preparation for the planting of trees and shrubs should be continued. Where compost is available it should be incorporated into the future root area and allowed to settle down before planting. Compost now in the bins should be turned and mixed as the bins become full. Material given its second turning now should be in good condition for using in spring.

Trees and shrubs especially should be examined closely for the presence of insect pests such as scales, mealy bugs, or thrips and sprays should be applied as required.

Buying a Suit

By MAUD B. STRAIN,
Home Science Instructor,
Department of Agriculture,
Dunedin

A WELL chosen suit can be worn year after year and look good all the time, but a poorly chosen one can be a disappointment and an economic loss because it so often hangs unworn and unwanted after only a few wearings. Good material, good workmanship, and good fit are the characteristics of a good suit, and this article describes the points to look for in material and construction which will ensure a buyer that she is obtaining a good, durable article.

A good suit should be neatly pressed and have a smooth, built-in shape that does not let it hang limp.

THE purposeful shopper before looking for a suit will have given some thought to the matter, will know whether high fashion or general, all-round usefulness is to be the aim, and will have decided what price she is prepared to pay. If at the same time there is a definite colour choice and the approximate size is known, the selection will be narrowed down and much time saved.

A Becoming Design

The buyer should have some idea as to what styles are most suitable for her figure and bear in mind that a short, heavy woman looks better in a single-breasted jacket, that long narrow revers are slimming, that collarless styles or low, rolling collars are better for short necks, that dolman and raglan sleeves are for the square-shouldered only, that set-in sleeves with lightly padded shoulders are more flattering to the figure with narrow, sloping shoulders, and that the short-waisted woman should avoid close-fitting jackets.

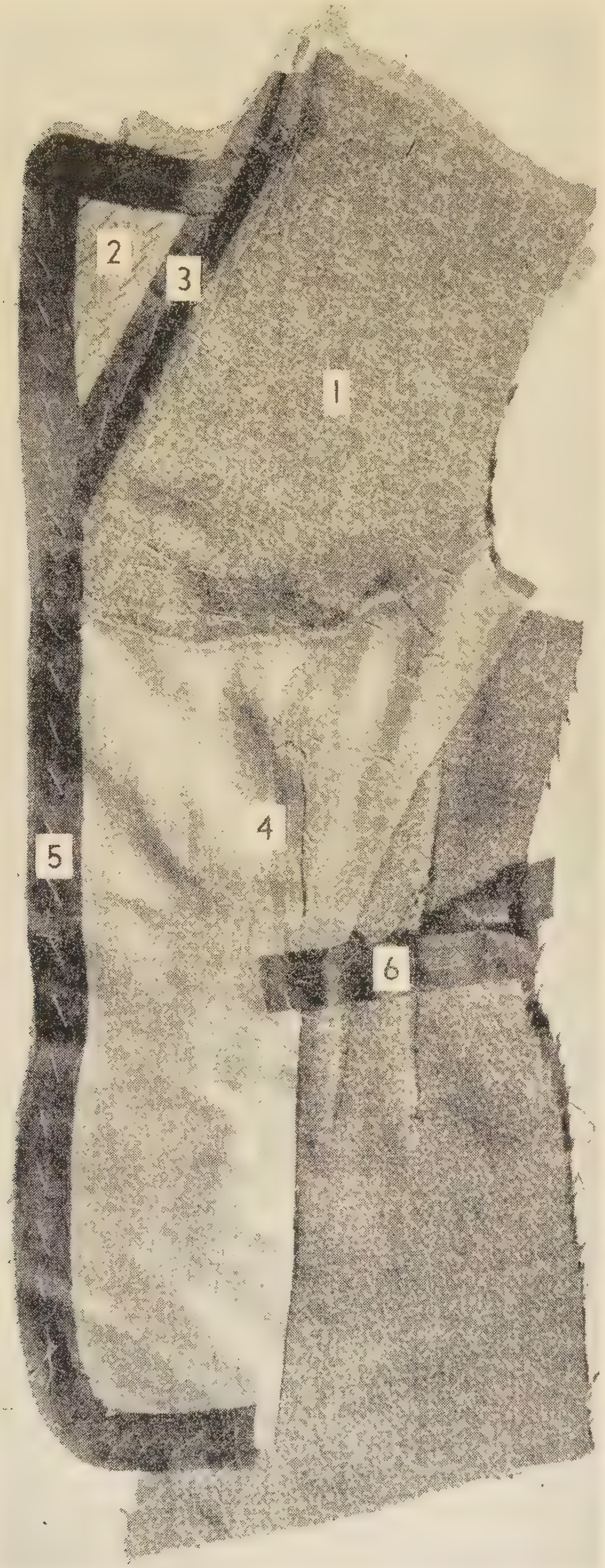
Slim, narrow skirts are for the slender woman with slender legs and a short stride, and if she is also tall, hem slits would not be out of place as they are on a short woman with short legs. Skirts fitted with darts at the waistline are most suitable for all figures, and for the stout woman with heavy legs, or one who walks with a long stride, a slight flare or low-placed pleats are more becoming. Skirt lengths should depend on what suits the individual rather than on any set number of inches from the floor, and it should be remembered that a narrow skirt pulls up much more when the wearer walks and sits than does one that is flared or pleated.

When the overall appearance of a suit is studied it is most important to make sure that the jacket length does not divide the figure in half. Disregard of this rule is detrimental to any type of figure, but is disastrous to the short woman.

With due regard to the above principles a buyer can choose a suit which is suitable for her figure and age, one that draws attention away from the less favourable features by highlighting the good ones. A young woman who because of her measurements must make her selection from sizes usually worn by older women must be careful to choose a style that is not too mature for her, and an older woman who must select from junior fittings must avoid the pitfall of choosing a junior style.

Characteristics of a Good Suit

A suit that is expected to give satisfaction over a long period of constant wear must conform to certain standards. The fabric must be durable and of good appearance, trimmings must be of a quality comparable with the fabric, linings should be of tightly woven material attached correctly,



tailoring must be faultless, and the fit must be exact, with sufficient ease to give comfort in action.

Suit Types

There are two distinct types of suit. One is, for the most part, a high-style garment made more to conform with fashion in colours, silhouettes, and other style features than with serviceability. Fabric is likely to be in the novelty class, and colour, trimmings, pocket, cuff, collar, and lapel details all conform with the dictates of high style. The design could be one originated by a world-famous dress designer. Clothing of this type is expensive because much of the cost goes into styling. To the buyer value is not reckoned in terms of durability and utility.

The second type, the classic suit about which this article is written, is included in the average woman's wardrobe because of its general usefulness and suitability for almost every occasion. It is simply designed on lines that do not date and is expected to keep its shape and appearance over a number of years. Styles for these vary little from year to year, any variation being so slight as to pass unnoticed by all but the acutely fashion conscious.

(This article discusses a high-class suit, whether bought "off the peg" or tailor made to individual measurements.)

Fabrics

Except for those who put high style before any other consideration the best choice is a good worsted material. An unobtrusive colour that harmonises with a wide range of other colours is probably the most satisfactory, as a more individualistic colour or a distinctive pattern becomes irksome if worn continuously. If warmth is a major requirement, not only the fabric but the style also should contribute to warmth.

← Inside view of a jacket in the making. 1—Padding covered with suit fabric stitched on to interlining. 2—Lapel shaped and stitched by hand. 3—Bridle stay. The coat front is eased on and any fullness shrunk out. 4—Linen interlining gives permanent body to the jacket coat. 5—Tape stay keeps edges firm. 6—Tape reinforcing the join under the decorative flap.

Trimmings and Tailoring

When new a suit with inferior tailoring and trimmings may look as good as a better suit, but good tailoring and trimming help a suit to hold its shape despite wear and dry cleaning. The jacket lining, usually of acetate or rayon, should be a firm, tight weave. The jacket should be interlined across the shoulders, collar, lapels, and down the front to give shape and body, and it should have built-in shoulder pads of good quality.

Hand-tailored or bound buttonholes and well made pockets go with a well made suit.

In the jacket, construction details are mostly hidden, but they can be seen in the skirt. Seams should be pinked or overcast with close stitching to prevent fraying and they should have adequate turnings to prevent slippage and to allow for letting out if necessary. Hems are less bulky and neater if seam tape is used for finishing.

During manufacture there is much pressing, during which seams and fabric are steamed, hand-ironed, shrunk, and stretched to produce the correct shape. When completed a final pressing and steaming puts the finishing touches to the suit. Where pressing and shaping have been done faithfully during construction the suit will retain its shape indefinitely.

Fit

Fitting rooms are usually equipped with mirrors so that the back and front of the garment being fitted can be seen at the same time. The jacket should look right both buttoned up and unbuttoned. There should be no drag round the armhole seams when the arms are moved. There should be sufficient ease in the skirt so that it does not appear to be tightly stretched across the figure and does not ride up excessively when the wearer sits down.

A suit that requires any more than the simplest of alterations—such as letting down or raising the hem at the bottom of the jacket or skirt, or lengthening or shortening the sleeves—should not be considered. If the waist of the jacket is not in the right place, if the collar bulges, or if the fit of back, bust, or waist is faulty, the suit cannot be altered without destroying the shape and set which have been so carefully built into it in the making.

Checking the Fit

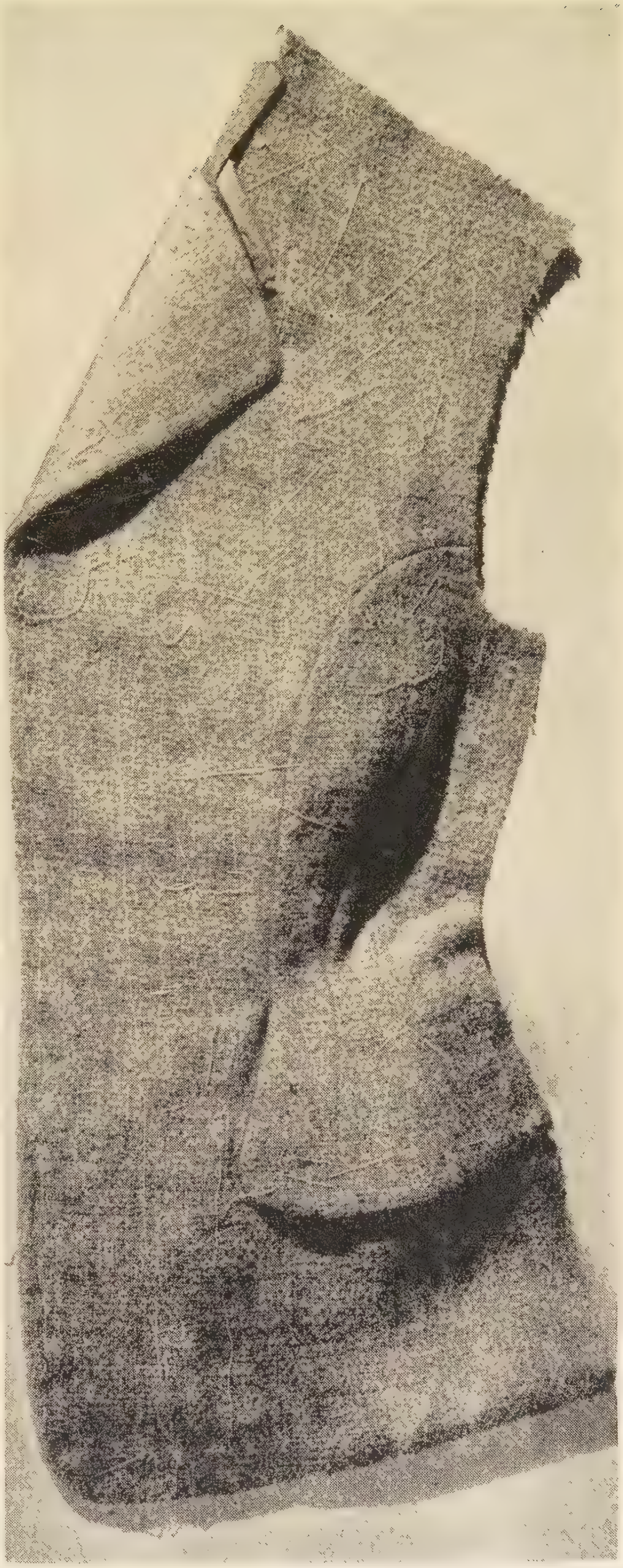
The suit should be tried on over underclothes similar to those with which it will be worn.

The front, back, and sides should be viewed critically in the mirror, and also the look of the suit as the wearer walks, sits, and moves her arms.

The collar should hold in close to the neck, and the roll of the lapel should hold close to the chest without any bulging or bowing out. The shoulder line should be straight from the neck to the highest point of the sleeve.

The garment must be cut with the grain of the material, as if it is cut off-grain, it will never hang properly. It will twist in wear and this cannot be rectified.

Darts in the jacket should be directed toward the bust.



The jacket front after the facing has been sewn in → place and the lapel rolled back.

Sleeves should be sufficiently roomy to accommodate whatever is to be worn underneath and should have sufficient ease to allow the elbows to move without constriction. The length of the sleeve should be such that it reaches the wristbone when the arm is bent sufficiently for the lobe of the ear on the same side to be touched. The curve of the lengthwise seam in the jacket should be very slightly below the natural waistline.

The closing should fasten without strain. If the garment is fitted or semi-fitted, the waist fastening should be exactly at the waistline.

The lower edge of the jacket should run straight round the figure at an even distance from the floor all round.

The skirt should allow easy walking and there should be sufficient ease for sitting without the skirt riding up, wrinkling sharply across the front, or cupping under at the back. The waistband should be snug but not tight. The fastening should lie flat and smooth and not be under strain. The skirt should hang straight and the lower edge should be the same distance from the floor all round.

A firmly woven lining material fitted in the back section of the skirt from the waist to below seat level prevents a slim skirt from cupping under at the seat.

Quality

Low-grade Suits

Low-grade suits are usually mass produced of less durable and lower quality material than the materials that tailor and press well and are used for high-grade suits. Patterns are placed on a pile of material layer on layer with as much accuracy as possible, but the same attention to detail cannot be given to each pattern piece when numerous thicknesses are cut out at the same time with an electric cutter.

SPEEDWAY
STERILISER
BURNS OIL OR WOOD
Write for FREE
Illustrated Catalogue
SPEEDWAY PRODUCTS LTD.
GT. SOUTH ROAD, PENROSE
P.O. BOX 24 and at
FORD BUILDINGS, COURTENAY PLACE
WELLINGTON
159 WORCESTER ST. CHRISTCHURCH
STEAM & BOILING WATER

HOLIDAY NEWS
BIG CONCESSION RATES FOR ADVANCE BOOKINGS

BIG concession rates are offered for advance bookings made now for MANSION HOUSE on beautiful KAWAU ISLAND—New Zealand's warmest climate holiday resort. These concessions apply to bookings from after EASTER until Christmas, 1959. Write, wire or phone MANSION HOUSE, Phone 6, KAWAU ISLAND.

Containing 208 pages
with
624 popular recipes
prepared by the Home
Science Instructors of
the Department of
Agriculture,
the

" 'Journal of Agriculture' Cookery Book"

is obtainable from main offices of the Department, post free, or from booksellers.

Stocks available at
6s. 6d.

Comfort comes first on these yacht-like ships . . . your spacious living room by day converts easily into a comfortable bedroom. Each room has private shower. The only all first class completely air-conditioned gyro-stabilized liners in the South Pacific.

Marvellous the way
they do things

go **Matson**
to and from **America**

There's no better way of going by sea than on a Matson liner. You call the tune . . . your slightest whim is pandered to. There's entertainment, relaxation, delicious food, sports, spaciousness . . . all with a friendliness that's essentially American. Just let Matson pamper you . . . you'll love it!

Information and reservations from your local Matson Agent or

MATSON LINES
73 Queen Street, Auckland Phone 32-841.

S.S. MONTEREY S.S. MARIPOSA
3.9

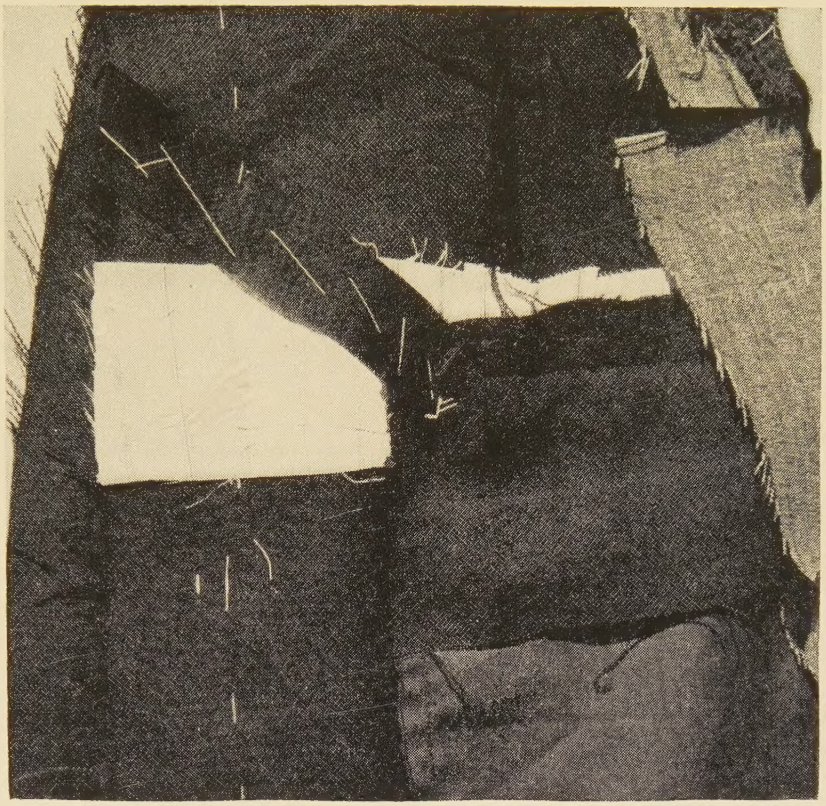
youthful and so very chic . . . styled by Academy
4664
Academy Patterns
4675

Since the object is a low-priced suit, because hand-work is expensive, most operations are done by machine. There is no hand shaping, pressing is reduced to a minimum, and only the setting in of the lining round the armholes is done by hand. The jacket has little rigidity of shape and whatever of this there may be is often considerably lessened after the first dry cleaning.

High-grade Suits

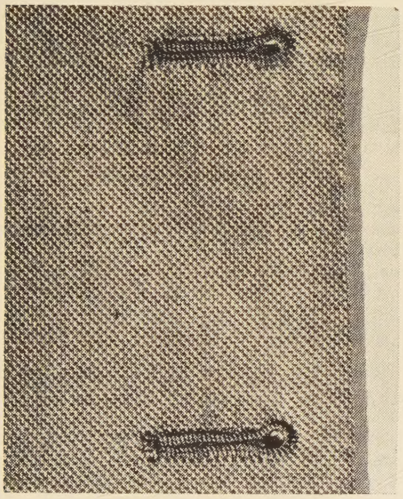
High-grade suits are made from materials that tailor and press well. The materials are shrunk and inspected for flaws. Patterns are placed on the material carefully to ensure that they lie exactly with the grain of the material. This is most important for comfort and the correct hang of the garment on the wearer. Cutting is carefully done by hand. The garment is assembled and stitched with close, even stitching with perfectly matched thread by skilled craftsmen. Silk thread is used because it is strong and has considerable elasticity and does not break if seams are strained. Between sewing operations pressers steam and mould the garment, actually building in the shape, and this remains as long as the garment lasts.

A good suit looks good. It is neatly pressed and smoothly shaped, with a built-in shape that does not let it hang limp and lifeless. Also it keeps its colour.



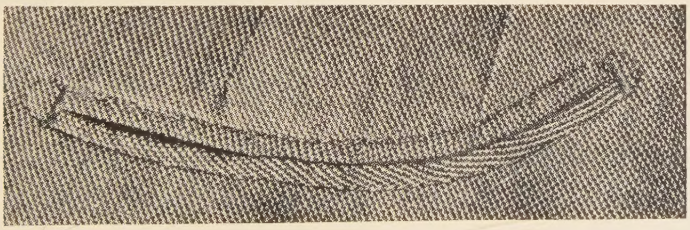
Pocket corners are reinforced on the inside with strips of firm lining material to keep them securely in place. Pocket lining is strong, closely woven material.

Buttonholes, pocket corners, skirt plackets, and any places where there may be tension in wear or that receive rougher treatment are firmly made and well finished. Buttonholes are cut carefully with the grain of the material because if they are off grain, they will stretch and hang open in wear. Bindings of bound buttonholes are even, narrow, squared off at the ends, and securely stitched. If these pull out in use, they cannot be satisfactorily mended. Worked buttonholes have even, close stitching with a bar at the end for reinforcing.



← Buttonholes are cut carefully with the grain of the material. Worked buttonholes as shown here have close, even stitching with a bar at one end and with the other end rounded to accommodate the shank of the button. Bound buttonholes are even, narrow, squared off at the ends, and securely stitched.

▼ This type of pocket opening is sewn in a similar way to bound buttonholes.

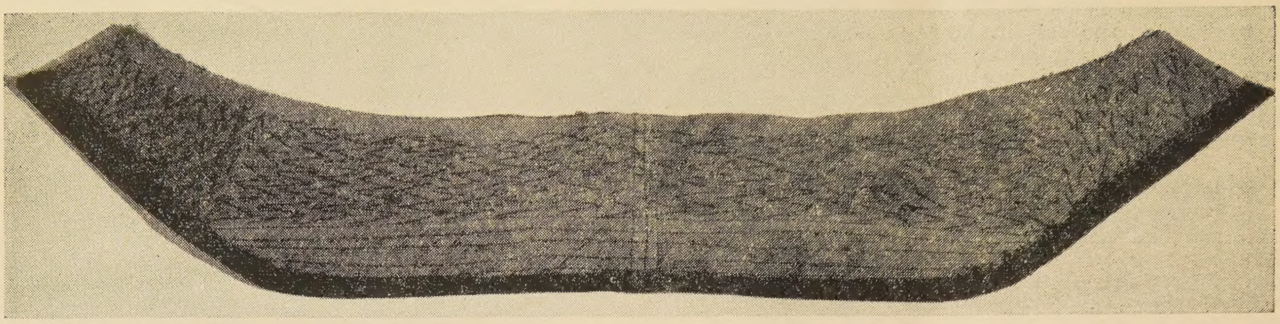


The sleeves hang naturally, without wrinkles or signs of tension and with a slight forward curve achieved by skilful pressing and shaping of the inner sleeve seam.

Linings are of a quality comparable with the suit material and are neatly fitted with ample room for movement. A pleat down the centre back of the lining allows for this as do extra width and length in the sleeve lining. The sleeve lining is hand sewn round the armhole so that the lining will stay in place as the garment is put on and taken off. Linings have a good seam allowance and the edges are hemmed or oversewn to avoid fraying in wear or when the garment is cleaned. Pocket linings are of strong, closely woven material.

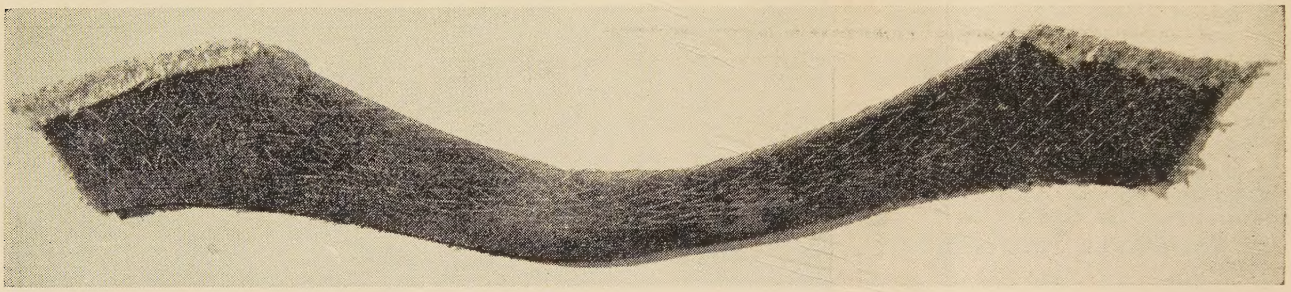
Construction Details

It could be said of the high-class tailored suit that the jacket is constructed on a framework, which is the interlining. This framework, carefully made according to a set of



The collar, showing the linen interlining and the hand stitching attaching it to the suit fabric.

▼ The shape achieved by steaming and pressing.



measurements, is the key to good fit and permanent shape. It gives definition of shape to those parts where some permanence of shape is essential such as over the shoulders (back and front), in the collar, through the bust section, and the front facings. Shape is built in by moulding to fit, steaming and pressing repeatedly until the interlining is permanently set in that shape.

Part of the front facing is later turned back to form the lapel; this lapel section is hand stitched with rows of stitching placed close together and running parallel to the stay tape (bridle) which marks the line where the lapel turns back.

The way in which the interlining is sewn on to the material and the manner in which it is pressed and moulded into shape make it impossible for the collar to lose its shape or the lapels to curl. The facing is eased on to the interlining and any fullness there may be over the stay tape is shrunk out. This makes the lapel line hold to the chest in wear. Pocket openings are reinforced and the ends are made secure so that if the pocket is overloaded, it does not drag the jacket out of shape.

Light padding on the interlining at the shoulder, with shoulder pads as necessary, gives firm, soft shoulders and an even shoulder line. A thin roll of padding round the armhole at the top of the sleeve holds the sleeve out sufficiently to give a smooth line over the top of the arm.

Choice of Material

A high-grade suit of the type described is not inexpensive. The amount of time and work, mostly unseen and unrealised at a casual glance, does not permit of budget pricing.

The expense is justified only with a material capable of retaining its shape and appearance with the minimum amount of attention over a long period of constant use. The obvious choice is a good worsted material. Tweeds and other loosely woven woollens tend to lose shape, gabardines and hopsacks become shiny in wear, and crepe weaves pick up lint. Generally, close, firm weaves wear better than loose weaves, and worsteds wear better than woollens.

Man-made Fibres

Materials made from man-made fibres and materials in which man-made fibres are blended with natural fibres are becoming increasingly available and are used extensively in countries where wool is less plentiful and more costly.

No other fabric has been produced possessing all the qualities of wool, and a high-quality, all-wool worsted cannot be surpassed for comfort, appearance, and durability. There are, however, man-made fibres which are blended with wool for special effects. For example, up to 25 per cent of nylon blended with woollens (as distinct from worsteds) adds to durability and shape retention.

There are available various spun rayon fabrics with a close superficial resemblance to wool, but there the similarity ends. They have not the resilience, the warmth, or the insulating properties of wool, and they cannot be moulded and pressed to retain a permanent shape.

When buying a suit "off the peg" it is well to remember that manufacturers who have built up a reputation over the years for all-round high quality in their goods can be relied on to guard that reputation by always offering the best value in material and workmanship possible in that particular price range.

Competition can be relied on to ensure that price and value are closely related.

With the exception of the heading photograph all illustrations are by Campbell.

Printed by Blundell Bros. Ltd. (The Evening Post), Wellington—9368

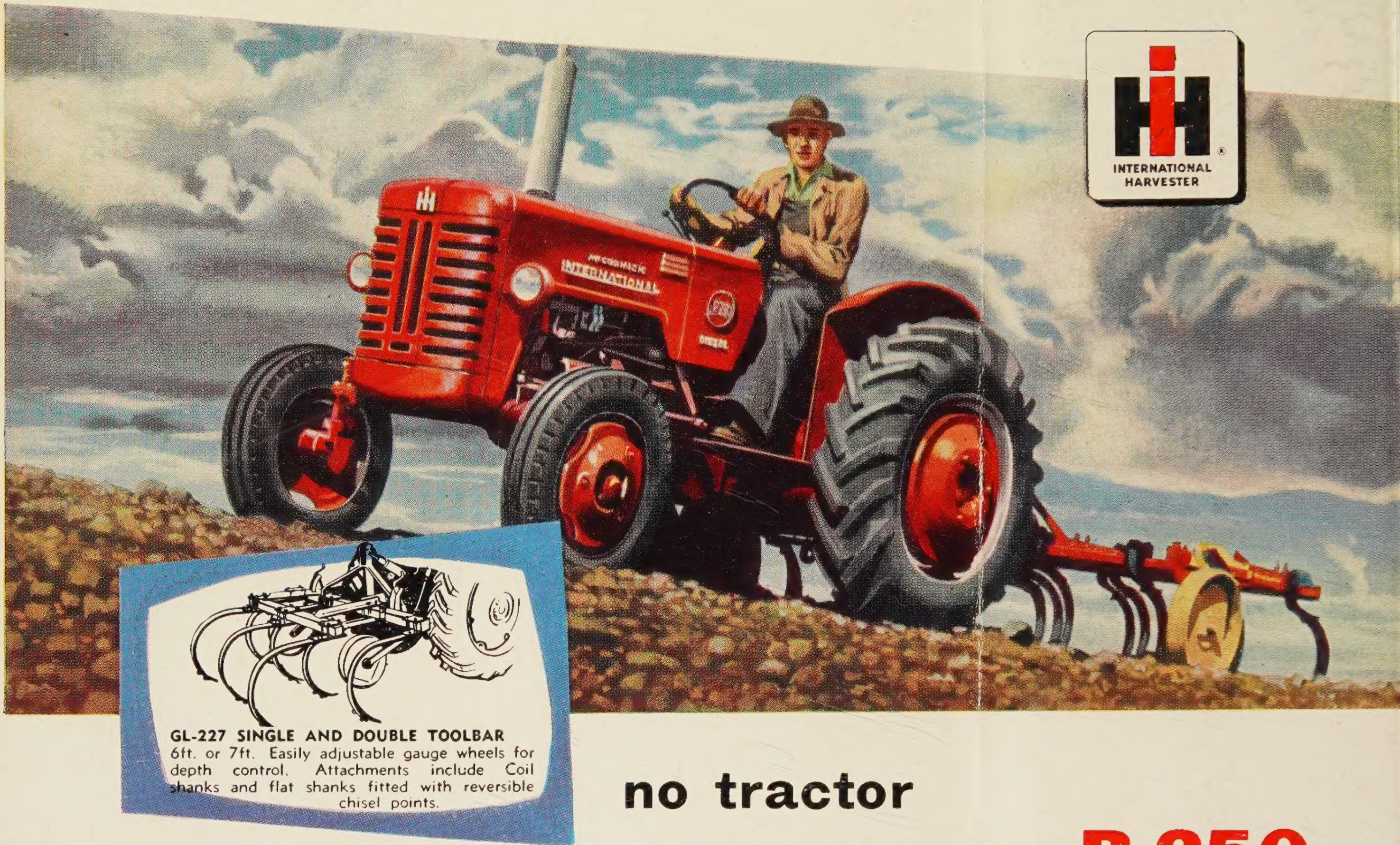
Destination.. dump or dimpled cheek?

Cool store owners know in advance! Carefully tended trees and unblemished crops won't mean much if the market isn't ripe at the same time. A glutted market can mean rotting fruit . . . months of work wasted. That is, unless you have a Westinghouse Recold Cool Store. Safely resting in controlled cold, your fruit remains as crisp and fresh as harvest morn until the *market* turns rosy. Orchardists all over the country are saying "I should have installed a cool store years ago". It costs you nothing for an estimate from any of the agents listed below.

H. W. Clarke (N.Z.) Ltd., 42-46 Cable Street, Wellington; 10 Teed Street, Newmarket, Auckland; 256 Cashel Street, Christchurch; 1 Cliff Street, Timaru; 84 Tainui Street, Greymouth; 280 Hardy Street, Nelson; Cnr. Great King and St. Andrews Streets, Dunedin; 159 Spey Street, Invercargill.

H.W. CLARKE
WESTINGHOUSE
RECOLD STORE

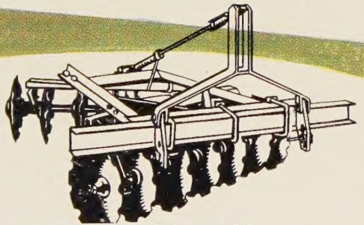
for winter "goings on"



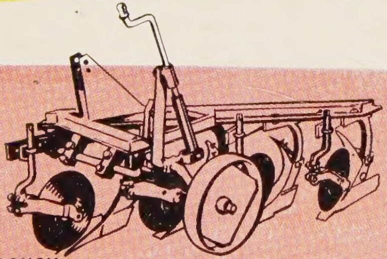
GL-227 SINGLE AND DOUBLE TOOLBAR
6ft. or 7ft. Easily adjustable gauge wheels for depth control. Attachments include Coil shanks and flat shanks fitted with reversible chisel points.

no tractor can match the B-250 and its Winter Equipment

You can keep going, on and on through the worst conditions "Old Man Winter" can conjure up, if you own an INTERNATIONAL B-250. The reversible 3-point linkage lets you haul a greater variety of implements, while the inbuilt weight transfer, disc brakes and diff-lock make the B-250 a must when the going is tough.

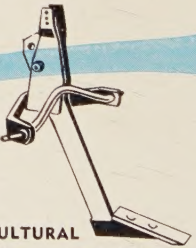


GL-325 OFFSET DISC HARROW
For heavy-duty tillage. Spring-loaded top-link and easy off-setting to either side. 14 discs, 20ins.



DUO-PLOUGH
Interchangeable disc or mould-board units, gauge wheel, beam weights and disc scrapers. 2, 3, or 4 furrow units.

McCORMICK
INTERNATIONAL



GL-224 AGRICULTURAL RIPPER
For hard ripping to 16ins. below ground level. Easily adjustable and tipped with silicone manganese steel.

SEE YOUR LOCAL IH DEALER NOW

INTERNATIONAL HARVESTER

INTERNATIONAL HARVESTER COMPANY OF N.Z. LIMITED
Branches and Dealers throughout New Zealand